ICOM

SERVICE MANUAL

VHF MARINE TRANSCEIVER

IC-M402

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-M402** VHF MARINE TRANSCEIVER at the time of publication.
2 versions of the **IC-M402** have been designed. This service manual covers each version.

MODEL	VERSION	SYNBOL
IC-M402	USA	BLACK
	USA-1	WHITE

To upgrade quality, anyelectrical or mechanical parts and internal circuits are subject to change without notice or obligation.

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. This will ruin the transceiver.

DO NOT expose the transceiver to rain, snow or any liquids.

DO NOT reverse the polarities of the power supply when connecting the transceiver.

DO NOT apply an RF signal of more than 20 dBm (100mW) to the antenna connector. This could damage the transceiver's front end.

ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

<**SAMPLE ORDER**>

1110003200 S.IC TA31136FN IC-M402 MAIN UNIT 5 pieces
8810006050 Screw Icom screw E7 IC-M402 Chassis 10 pieces

Addresses are provided on the inside back cover for your convenience.

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated turning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB to 50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

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SECTION 1 SPECIFICATIONS

■ GENERAL

- Frequency coverage : 156.025–157.425 MHz (Tx)
  156.050–163.275 MHz (Rx)
- Mode : 16K0G3E (FM)
  16K0G2B (DSC)
- Usable channels : All USA, international and Canadian channels plus 10 weather channels
- Power supply requirement : 13.8 V DC ±10 % (negative ground)
- Usable temperature range : –20˚C to +60˚C; –4˚F to +140˚F
- Frequency stability : ±10 ppm (–20˚C to +60˚C; –4˚F to +140˚F)
- Current drain (at 13.8 V DC) : Transmit at 25 W 6.0 A (approx.)
  Receive max. audio 1.2 A (approx.)
- Antenna impedance : 50 Ω (nominal)
- Input impedance (MIC) : 600 Ω
- Output impedance (Audio) : 4 Ω
- Dimensions (projections not included) : 153(W)×67(H)×141.6(D) mm; 6(W)×2⅝(H)×5⅗(D) in
- Weight : 900 g; 2 lb

■ TRANSMITTER

- Output power (at 13.8 V DC) : High 25 W
  Low 1 W
- Modulation : Variable reactance frequency modulation
- Maximum frequency deviation : ±5.0 kHz
- Frequency error : ±10 ppm
- Spurious emissions : 70 dBc
- Adjacent channel power : 70 dB
- Residual modulation : 40 dB
- Audio harmonic distortion : Less than 10% at 60% deviation
- Audio frequency response : +1 dB to –3 dB of 6 dB octave from 300 Hz to 2500 Hz

■ RECEIVER

- Receive system : Double conversion superheterodyne system
- Intermediate frequencies : 1st 21.7 MHz
  2nd 450 kHz
- Sensitivity : 0.32 µV at 12 dB SINAD
- Squelch sensitivity : 0.32 µV
- Adjacent channel selectivity : 70 dB
- Spurious response : 70 dB
- Intermodulation rejection ratio : 70 dB
- Hum and noise : 40 dB
- Audio output power (at 13.8 V DC) : 4.5 W typical at 10% distortion with an 4 Ω load
- Audio frequency responce : +1 dB to –3 dB of –6 dB octave from 300 Hz to 3000 Hz

Specifications are measured in accordance with TIA/EIA-603

All stated specifications are subject to change without notice or obligation.

■ VHF MARINE CHANNEL LIST

Channel No.			Frequency (MHz)		Channel No.			Frequency (MHz)		Channel No.			Frequency (MHz)	
USA	INT	CAN	Transmit	Receive	USA	INT	CAN	Transmit	Receive	USA	INT	CAN	Transmit	Receive
	01	01	156.050	160.650	21A		21A	157.050	157.050	73	73	73	156.675	156.675
01A			156.050	156.050		22		157.100	161.700	74	74	74	156.725	156.725
	02	02	156.100	160.700	22A		22A	157.100	157.100	77*1	77	77*1	156.875	156.875
	03	03	156.150	160.750		23	23	157.150	161.750		78		156.925	161.525
03A			156.150	156.150	23A			157.150	157.150	78A		78A	156.925	156.925
	04		156.200	160.800	24	24	24	157.200	161.800		79		156.975	161.575
		04A	156.200	156.200	25	25	25	157.250	161.850	79A		79A	156.975	156.975
	05		156.250	160.850	26	26	26	157.300	161.900		80		157.025	161.625
05A		05A	156.250	156.250	27	27	27	157.350	161.950	80A		80A	157.025	157.025
06	06	06	156.300	156.300	28	28	28	157.400	162.000		81		157.075	161.675
	07		156.350	160.950		60	60	156.025	160.625	81A		81A	157.075	157.075
07A		07A	156.350	156.350		61		156.075	160.675		82		157.125	161.725
08	08	08	156.400	156.400	61A		61A	156.075	156.075	82A		82A	157.125	157.125
09	09	09	156.450	156.450		62		156.125	160.725		83	83	157.175	161.775
10	10	10	156.500	156.500			62A	156.125	156.125	83A		83A	157.175	157.175
11	11	11	156.550	156.550		63		156.175	160.775	84	84	84	157.225	161.825
12	12	12	156.600	156.600	63A			156.175	156.175	84A			157.225	157.225
13*2	13	13*1	156.650	156.650		64	64	156.225	160.825	85	85	85	157.275	161.875
14	14	14	156.700	156.700	64A		64A	156.225	156.225	85A			157.275	157.275
15*2	15*1	15*1	156.750	156.750		65		156.275	160.875	86	86	86	157.325	161.925
16	16	16	156.800	156.800	65A	65A	65A	156.275	156.275	86A			157.325	157.325
17*1	17	17*1	156.850	156.850		66		156.325	160.925	87	87	87	157.375	161.975
	18		156.900	161.500	66A	66A	66A*1	156.325	156.325	87A			157.375	157.375
18A		18A	156.900	156.900	67*2	67	67	156.375	156.375	88	88	88	157.425	162.025
	19		156.950	161.550	68	68	68	156.425	156.425	88A			157.425	157.425
19A		19A	156.950	156.950	69	69	69	156.475	156.475					
20	20	20*1	157.000	161.600	70*3	70*3	70*3	156.525	156.525					
20A			157.000	157.000	71	71	71	156.575	156.575					
	21	21	157.050	161.650	72	72	72	156.625	156.625					

*1 Low power only, *2 Momentary high power, *3 Receive only

NOTE: Channels 3, 21, 23, 61, 64, 81, 82 and 83 **CANNOT** be used by the general public in USA waters.

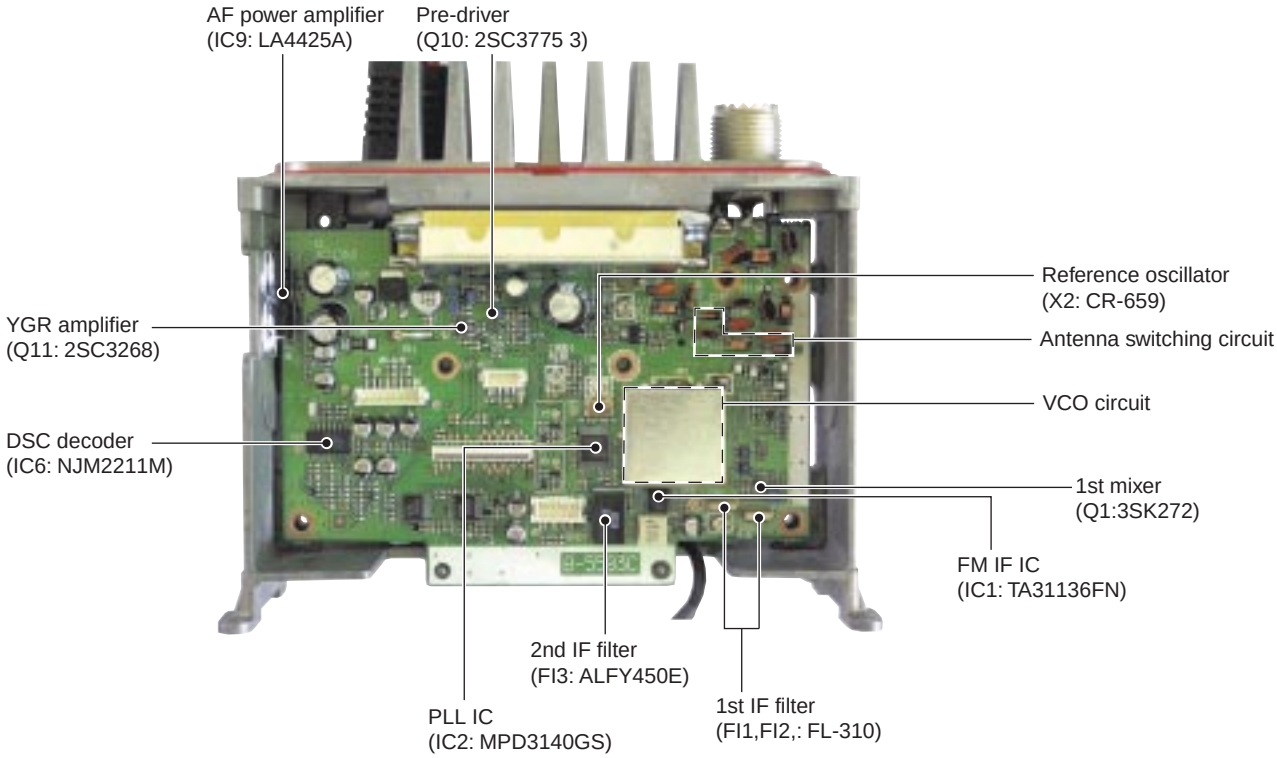
■ WX CHANNEL LIST

Weather channel	Frequency (MHz)		Weather channel	Frequency (MHz)	
	Transmit	Receive		Transmit	Receive
WX01	Receive only	162.550	WX06	Receive only	162.500
WX02	Receive only	162.400	WX07	Receive only	162.525
WX03	Receive only	162.475	WX08	Receive only	161.650
WX04	Receive only	162.425	WX09	Receive only	161.775
WX05	Receive only	162.450	WX10	Receive only	163.275

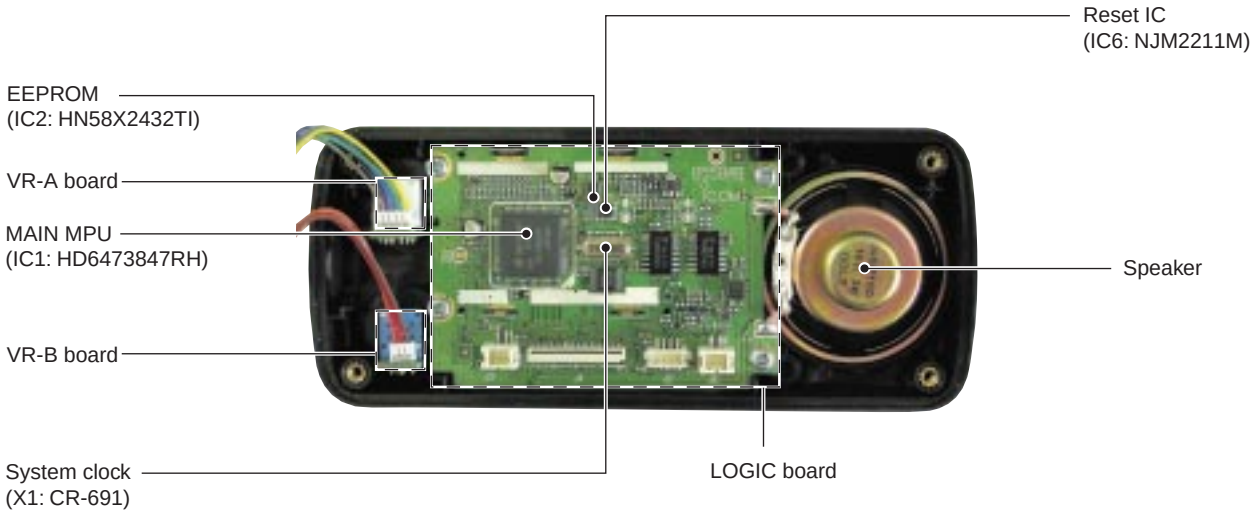
SECTION 2 INSIDE VIEWS

2-1 IC-M402

• MAIN UNIT

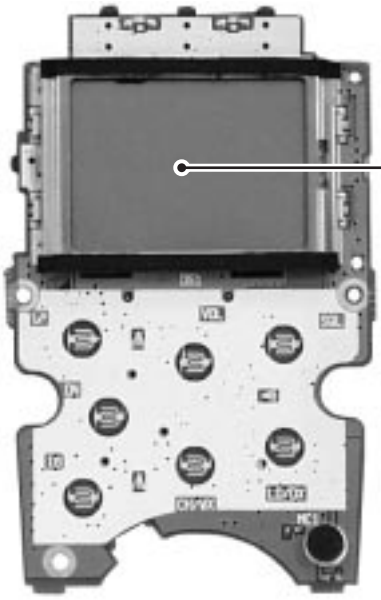


• FRONT UNIT

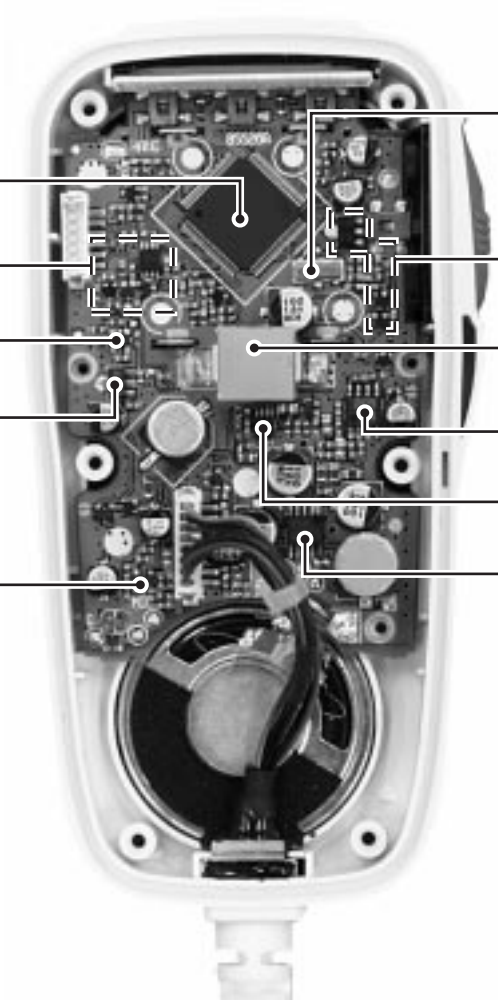


2-2 HM-127 (OPTIONAL UNIT)

• TOP VIEW



• BOTTOM VIEW

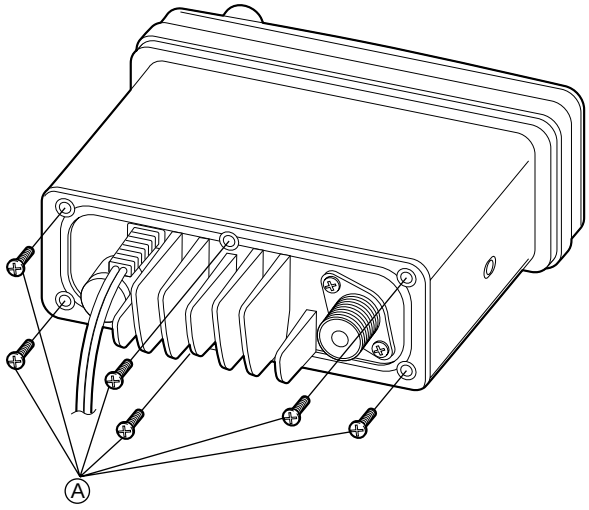


SECTION 3 DISASSEMBLY INSTRUCTIONS

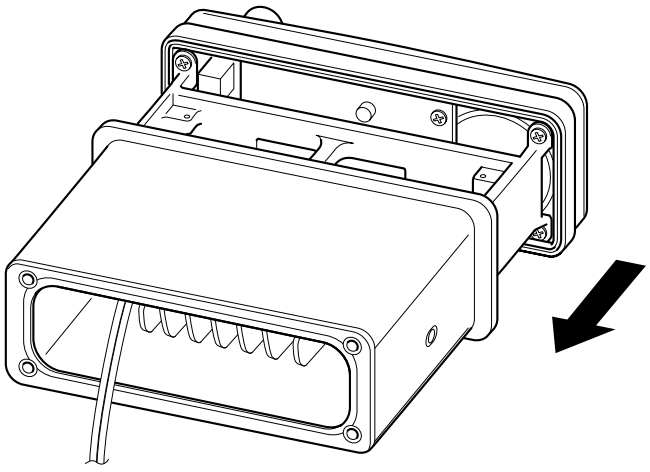
● REMOVING THE CASE

① Unscrew 6 screws, Ⓐ.

Note: When replacing the screw, 10–12 kg of torque MUST be applied to ensure water resistance.



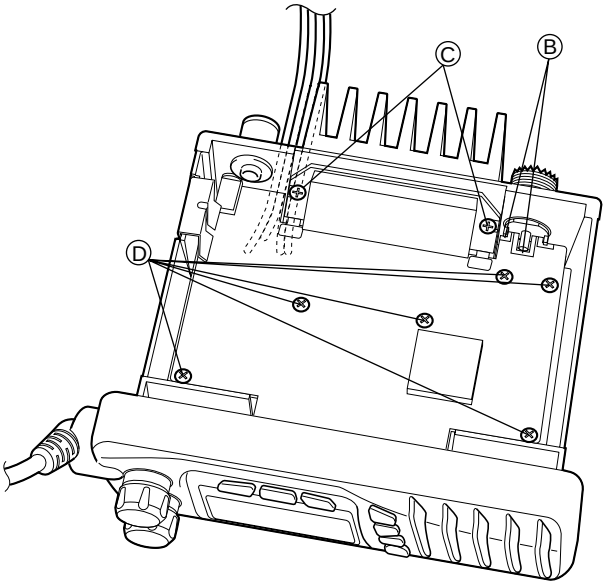
② Slide the case free of the chassis in the direction of the arrow.



● REMOVING THE MAIN UNIT

① Unsolder DC cable (4 points) and antenna connector, Ⓑ (2 points), as shown below.

② Unscrew 2 screws, Ⓒ, and 6 screws, Ⓓ, to remove the MAIN unit.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT (MAIN UNIT)

The antenna switching circuit functions as a low-pass filter while receiving and as resonator circuit while transmitting. The circuit does not allow transmit signals to enter receiver circuits.

Received signals enter the MAIN unit from the antenna connector and pass through the low-pass filter (L13, L14, C106–C109, C111). The signals are then applied to the RF circuit via the antenna switching circuit (D15, L15, C197, C198).

4-1-2 RF CIRCUIT (MAIN UNIT)

The RF circuit amplifies signals within the range of frequency coverage and filters out-of-band signals.

The signals from the antenna switching circuit pass through a tunable bandpass filter (D19, L16, L17, L19, L20, C199–C204, C206–C210) where the object signals are led to the RF amplifier circuit (Q27).

The amplified signals at Q7 are applied to the 3-stage tunable bandpass filter (D20, L21, L22, L24, L25, C213–C218, C220–C224) to suppress unwanted signals and improve the selectivity. The signals are then applied to the 1st mixer circuit.

4-1-3 1ST MIXER AND 1ST IF CIRCUITS (MAIN UNIT)

The 1st mixer circuit converts the received signal to a fixed frequency of the 1st IF signal with a 1st LO (VCO output) frequency. By changing the 1st LO frequency, only the desired frequency will be passed through two crystal filters at the next stage of the mixer.

The signals from the RF circuit are mixed with the VCO signals at the 1st mixer circuit (Q1) to produce a 21.7 MHz 1st IF signal.

The 1st IF signal is applied to two crystal filters (FI1, FI2) to suppress out-of-band signals and is then amplified at the IF amplifier (Q2). The amplified signal is applied to the 2nd mixer circuit (IC1).

4-1-4 2ND IF AND DEMODULATOR CIRCUITS (MAIN UNIT)

The 2nd mixer circuit converts the 1st IF signal to a 2nd IF signal. A double superheterodyne system (which converts receive signals twice) improves the image rejection ratio and obtains stable receiver gain.

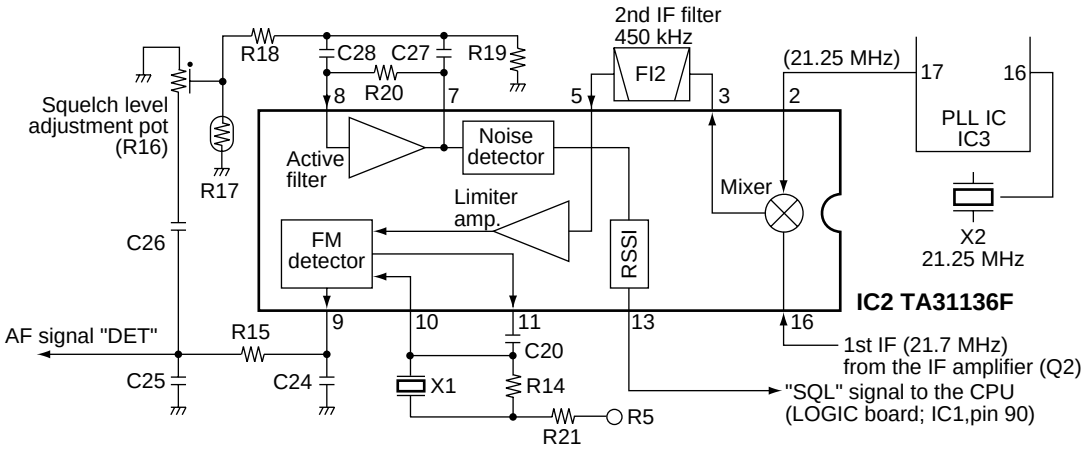
The FM IF IC (IC1) contains the 2nd local oscillator, 2nd mixer, limiter amplifier, quadrature detector, and noise detector circuits, etc.

The 1st IF signal from Q2 is applied to the 2nd mixer section of IC1 (pin 16), and is mixed with a 21.25 MHz 2nd LO signal generated at the PLL circuit using the reference frequency (21.25 MHz) to produce a 450 kHz 2nd IF signal.

The 2nd IF signal from IC1 (pin 3) is passed through the ceramic filter (FI3), where unwanted signals are suppressed, and is then applied to the 2nd IF (limiter) amplifier in IC1 (pin 5). The signal is applied to the FM detector section in IC1 for demodulation into AF signals.

The FM detector circuit employs a quadrature detection method (linear phase detection), which uses a ceramic discriminator (X1) for phase delay to obtain a non-adjusting circuit. The detected signal from IC1 (pin 9) is applied to the AF circuit.

• 2ND IF AND DEMODULATOR CIRCUITS



4-1-5 AF AMPLIFIER CIRCUIT (MAIN AND FRONT UNITS)

The AF amplifier circuit amplifies the detected signals to drive a speaker. The AF circuit includes an AF mute circuit for the squelch.

AF signals from IC1 (pin 9) are applied to the de-emphasis circuit (R101, C140). The de-emphasis circuit is an integrated circuit with frequency characteristic of –6 dB/octave.

The integrated signals pass through the high-pass filter (Q21, R96–R100, C138, C139) to suppress unwanted lower noise signals.

The filtered signals are applied to the AF mute circuit (IC5A), and then passes through the [VOLUME] control (VR-A board; R1) via the “VOL1” signal. The signals are applied to the AF power amplifier (IC9, pin 1). The output signal from IC9 (pin4) drives the internal (external) speaker.

4-1-6 SQUELCH CIRCUIT (MAIN UNIT AND LOGIC BOARD)

A squelch circuit cuts out AF signals when no RF signals are received. By detecting noise components in the AF signals, the squelch circuit switches the AF mute switch.

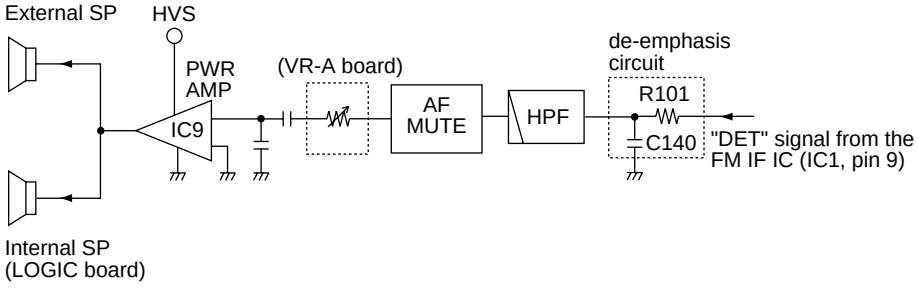
A portion of the AF signals from the FM IF IC (IC1, pin 9) pass through the squelch adjustment pot (R16), and are then applied to the active filter section (IC1, pin 8). The active filter section amplifies and filters noise components. The filtered signals are applied to the noise detector section and output from pin 14 as the “SQL” signal. The “SQL” signal is applied to the CPU (LOGIC board; IC1, pin 90). The CPU analyzes the noise condition and outputs the “RMUM”, “RMUTS” signals to toggle the AF mute switches (IC5A, IC5B).

4-1-7 WEATHER ALERT DECODER CIRCUIT (MAIN UNIT AND LOGIC BOARD)

When the weather alert function is activated and a 1050 Hz alert tone from an NOAA weather radio broadcast is received, the IC-M402 emits beep tones and indicates flashing “ALT” on the display to inform of an emergency weather report on the air.

AF signals from the FM IF IC (IC1, pin 9) pass through the low-pass filter (Q28) via the “DET” signal, and are then applied to A/D port of the CPU (LOGIC board; IC1, pin 88) as “WXDEC” signal. The CPU has the tone decoder function. When a 1050 Hz signal is detected by software decode, the CPU (LOGIC unit; IC1) controls beep tones and the “ALT” indicator.

• AF AMPLIFIER CIRCUIT



4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT (MAIN UNIT)

The microphone amplifier circuit amplifies audio signals with +6 dB/octave pre-emphasis from the microphone to a level needed at the modulation circuit.

The AF signals from the microphone are amplified at the microphone amplifier (IC7B) via the analog switch (IC4A, pin 1). A capacitor (C159) and resistor (R121) are connected to the amplifier to obtain the pre-emphasis characteristics.

The amplified signals are applied to the IDC amplifier (IC7C, pin 9) and are passed through the splatter filter (IC7D) to suppress unwanted 3 kHz or higher signals. The filtered signals are then applied to the modulation circuit.

4-2-2 MODULATION CIRCUIT (MAIN UNIT)

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signals.

Audio signals from the splatter filter (IC7D) pass through the frequency deviation adjustment pot (R138) and are then applied to the modulation circuit (D2, D3, D4) to change the reactance of D2, D3, D4 and modulate the oscillated signal at the VCO (Q5, Q6).

4-2-3 DRIVE AMPLIFIER CIRCUIT (MAIN UNIT)

The drive amplifier circuit amplifies the VCO oscillating signal to a level needed at the power amplifier.

The VCO output is buffer-amplified by Q7 and Q9, and is then applied to the Tx/Rx switch (D6). The transmit signal from the Tx/Rx switch is amplified to the pre-drive (Q10) and YGR (Q11) amplifiers to obtain an approximate 300 mW signal level. The amplified signal is then applied to the RF power amplifier (IC3).

4-2-4 POWER AMPLIFIER CIRCUIT (MAIN UNIT)

The power amplifier circuit amplifies the driver signal to an output power level.

IC3 is a power module which has amplification output capabilities of about 35 W with 300 mW input. The output from IC3 (pin 4) is passed through the antenna switching circuit (D10) and is then applied to the antenna connector via the low-pass filter.

4-2-5 APC CIRCUIT (MAIN UNIT)

The APC circuit stabilizes transmit output power.

The RF output signal from the power amplifier (IC3) is detected at the power detector circuit (D8, D9, L12) and is then applied to one of the differential amplifier inputs (Q15, pin 5) via the High/Low control circuit (R71, Q16). The applied voltage controls the differential amplifier output (Q15, pin 2) and the bias voltage control (Q12). Thus the APC circuit maintains a constant output power.

4-3 PLL CIRCUITS

4-3-1 GENERAL

The PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL circuit compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by a crystal oscillator and the divided ratio of the programmable divider.

IC2 on the MAIN unit is a dual PLL IC which controls both VCO circuits for Tx and Rx, and contains a prescaler, programmable counter, programmable divider, phase detector, charge pump, etc.

The PLL circuit , using a one chip PLL IC (MAIN unit; IC2), directly generates the transmit frequency and receive 1st IF frequency with VCOs. The PLL sets the divided ratio based on serial data from the CPU on the LOGIC unit and compares the phases of VCO signals with the reference oscillator frequency. The PLL IC detects the out-of-step phase and output from pins 8 for Tx and Rx. The reference frequency (21.25 MHz) is oscillated at X2 (MAIN unit).

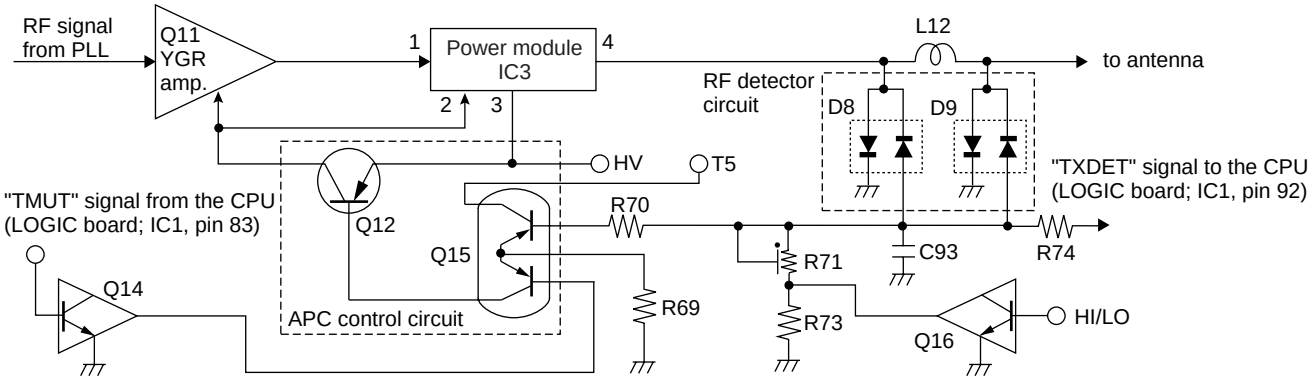
4-3-2 TX AND RX LOOP (MAIN UNIT)

The generated signal at the VCO (Q4, Q5, Q6, D1–D4) enters the PLL IC (IC2, pin 2) and is divided at the programmable divider section and is then applied to the phase detector section.

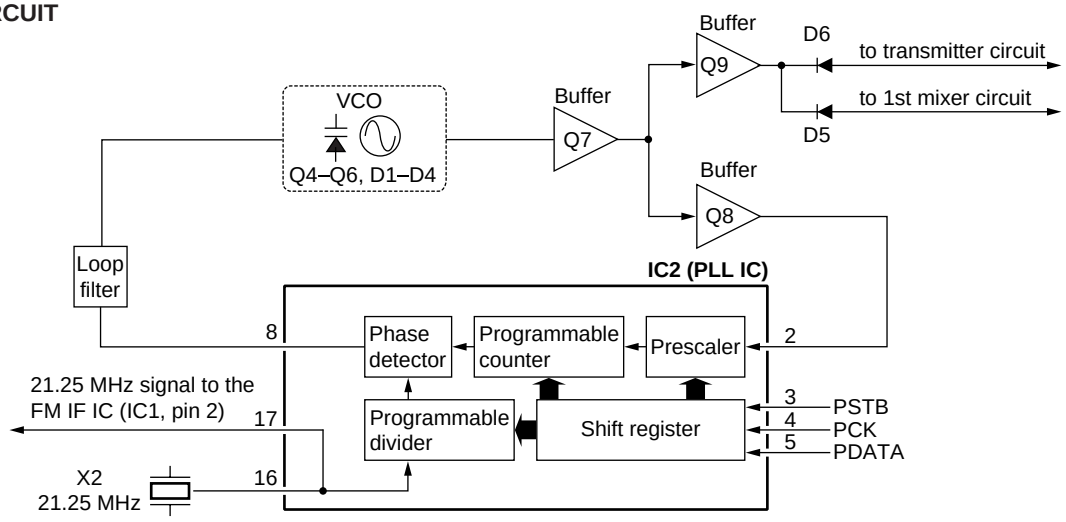
The phase detector compares the input signal with a reference frequency, and then outputs the out-of-phase signal (pulse-type signal) from pin 8.

The pulse-type signal is converted into DC voltage (lock voltage) at the loop filter (R29–R31, R41, C41, C42, C50, C51), and is then applied to varactor diodes (D3, D4) of the VCO to stabilize the oscillated frequency. The lock voltage from the loop filter is amplified at the buffer amplifier (Q7) and then applied to the RF circuit.

• APC CIRCUIT



• PLL CIRCUIT



4-3-4 VCO CIRCUIT (MAIN UNIT)

The VCO outputs from Q4–Q6 are buffer-amplified at the buffer amplifiers (Q7 and Q9), and are then sent to the Tx/Rx switch (D5 and D6). The receive LO signal is applied to the 1st mixer circuit (Q1) through a low-pass filter, and the transmit signal is applied to the pre-drive amplifier (Q10). A portion of the VCO output is reapplied to the PLL IC (IC2, pin 2) via the buffer amplifier (Q8).

4-4 DSC CIRCUITS

4-4-1 DSC ENCODE CIRCUIT (LOGIC BOARD AND MAIN UNIT)

The DSC signal created at CPU (IC1), is passed through the buffer amplifier (Q8), and applied to the D/A convertor (R55–R73) to convert into the analog signal. The analog signal passes through the low-pass filter (MAIN unit; IC7D), and is then applied to the VCO circuit to modulate the DSC signal.

4-4-2 DSC DECODE CIRCUIT (MAIN UNIT AND LOGIC BOARD)

The AF signal from the FM IF IC (IC1, pin 9) are filtered at the low-pass filter (Q28) to suppress unwanted higher noise signals. The filtered signals are converted analog signals into digital signals at the DSC decoder IC (IC6), and are then applied to the CPU (LOGIC board; IC1, pin 18).

4-5 LOGIC CIRCUITS (LOGIC BOARD)

• CPU

IC1 is an 8 bit signal chip micro-computer and contains LCD driver, serial I/O, timer, A/D converter, programmable I/O, ROM and RAM.

• SYSTEM CLOCK CIRCUIT

X1 is a ceramic oscillator and ocillate 9.8304 MHz system clock for the CPU (IC1).

• RESET CIRCUIT

IC6 is a reset IC. When turn power ON, IC6 outputs a reset signal (“LOW” pulse) to the CPU (IC1, pin 15) via the “RES” line.

• LOW BATTERY DETECTOR

HVS voltage is divided by R74, R75 and is applied to the low battery detector section in the CPU (IC1, pin 91) via the “LBAT” line.

• DIMMER CIRCUIT

CPU (IC1), Q2, Q3 and Q4 are dimmer circuit and control the 4 steps the LCD backlight (DS3–DS8).

4-6 POWER SUPPLY CIRCUITS

LINE	DESCRIPTION
HV	The voltage from the connected DC power supply.
HVS	Same voltage as the HV line which is passed through the [PWR] switch (VR-A board; R1).
VCC	Same voltage as the HVS line. The voltage is applied to the optional microphone (HM-127).
5V	Common 5 V converted from the HVS line at the 5V regulator circuit (MAIN unit; IC8).
T5	Transmit 5 V controlled by the 5V control circuit (MAIN unit; Q24, Q25) using the SEND signal from CPU (LOGIC board; IC1). The controlled voltage is applied to the transmitter circuit.
R5	Receive 5 V controlled by the R5 control circuit (MAIN unit; Q22, Q23) using the RCV circuit from CPU (LOGIC board; IC1). The controlled voltage is applied to the receiver circuit.

4-7 PORT ALLOCATIONS

4-7-1 CPU (LOGIC BOARD; IC1)

Pin number	Port name	Description
1 2	CONT1 CONT2	Outputs control signal for the LCD contrast. CONT1 / CONT2 / CONTRAST 0 / 0 / LIGHT 1 / 1 / DEEP
3	BEEP	Outputs beep audio signal.
5	CH16	Input port for the CH16 switch. Low: While CH16 switch is pushed.
6	CHWX	Input port for the CHWX switch. Low: While CHWX switch is pushed.
7	H/L	Input port for the H/L switch. Low: While H/L switch is pushed.
8	DSDEC	Input port for ATIS/DSC decode signal.
16	PCK	Outputs clock signal to the PLL IC (MAIN unit; IC2, pin 4).
17	PSTB	Outputs strobe signals to the PLL IC (MAIN unit; IC2, pin 3).
18	PDATA	Outputs data signals to the PLL IC (MAIN unit; IC2, pin 5).
20	ICFC	Outputs control signal to swtich NMEA or ICF3 (Optional unit; HM-127).
21	BPLVL	Outputs beep volume control signal. Low: Beep audio is maximum.
22	ECK	Outputs clock signal for the EEPROM (IC2, pin 6).
23	EDA	I/O port for the EEPROM data signals.
27	HI/LO	Output port for RF output power (High or Low) select signal.
28	RRXD	Input port for the communication data from HM-127.
29	RRXD	Outputs communication data to HM-127.
31	BPFV	Outputs bandpass filter select signals. Low: Receiving more than 160 MHz. High: Receiving less than 160 MHz.
83	TMUT	Outputs transmit mute signal. High: While transmitting.
84	NMEAI	Input port for GGA and NMEA data.
88	WXDEC	Input port for WX alert signal.
89	SQLV	Input port for the squelch volume level.
90	SQL	Input port from the FM IF IC (MAIN unit; IC1) for the squelch operation.
91	LBAT	Input port for the connected power supply voltage detection (low battery indicator).
92	TXDET	Input port for TX LED control signal.
93	KEYM	Input port for the smart mic functions. 2.02 V: [UP] is pushed. 3.00 V: [DN]] is pushed. 3.84 V: [16/9] is pushed.
94	PTT	Input port for the PTT switch from HM-129. Low: While PTT is pushed.
95	DTRS	Input port for the DTRS switch. Low: While DISTRESS switch is pushed.
96	DSC	Input port for the DSC switch. Low: While DSC switch is pushed.
97	UP	Input port for the UP switch. Low: While UP switch is pushed.
98	DOWN	Input port for the DOWN switch. Low: While DOWN switch is pushed.
99	UNLK	Input port for the PLL unlock signal. Low: While PLL is locked.

4-7-2 I/O EXPANDER IC (LOGIC BOARD; IC3)

Pin number	Port name	Description
4	RMUTM	Outputs the AF mute swtich (MAIN unit; IC5) control signal for main body. Low: While squelched
5	RMUTS	Outputs the AF mute swtich (MAIN unit; IC5) control signal for the optional remote microphone (HM-127). Low: While squelched
6	PTTM	Outputs main microphone (HM-129) select signal to the analog swtich (IC4) while intercom operation.
7	PTTS	Outputs optional microphone (HM-127) select signal to the analog swtich (IC4) while intercom operation.
11	MMUTE	Outputs select signal for the speaker of the main microphone (HM-129) to the analog swtich (IC5) while intercom operation.
12	SMUTE	Outputs select signal for the speaker of the optional microphone (HM-127) to the analog swtich (IC5) while intercom operation.
13	SEND	Outputs the T5 regulator (MAIN unit; Q24, Q25) control signal. High: While transmitting
14	RCV	Outputs the R5 regulator (MAIN unit; Q22, Q23) control signal. High: While receiving.

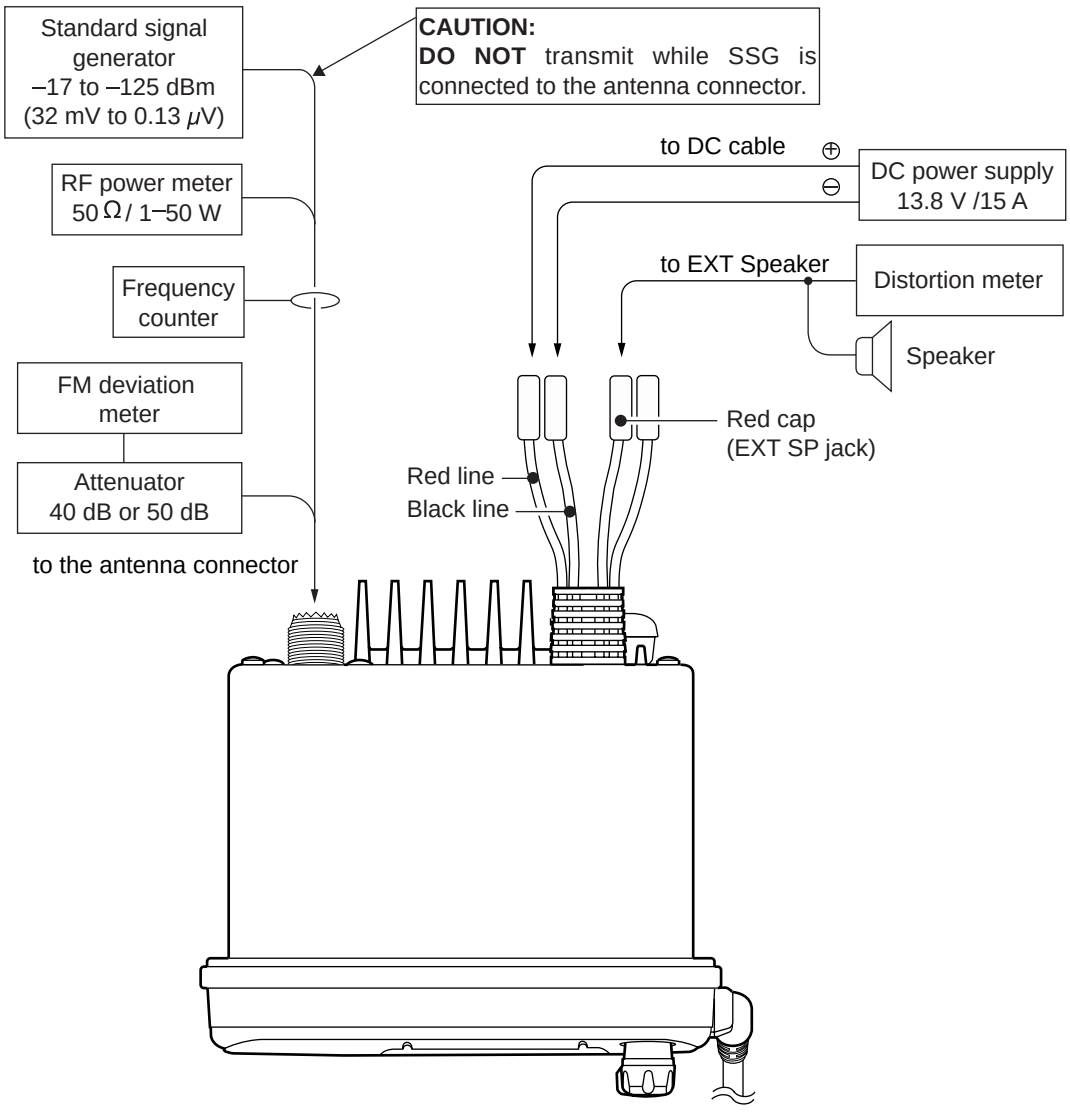
SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

■ REQUIRED TEST EQUIPMENT

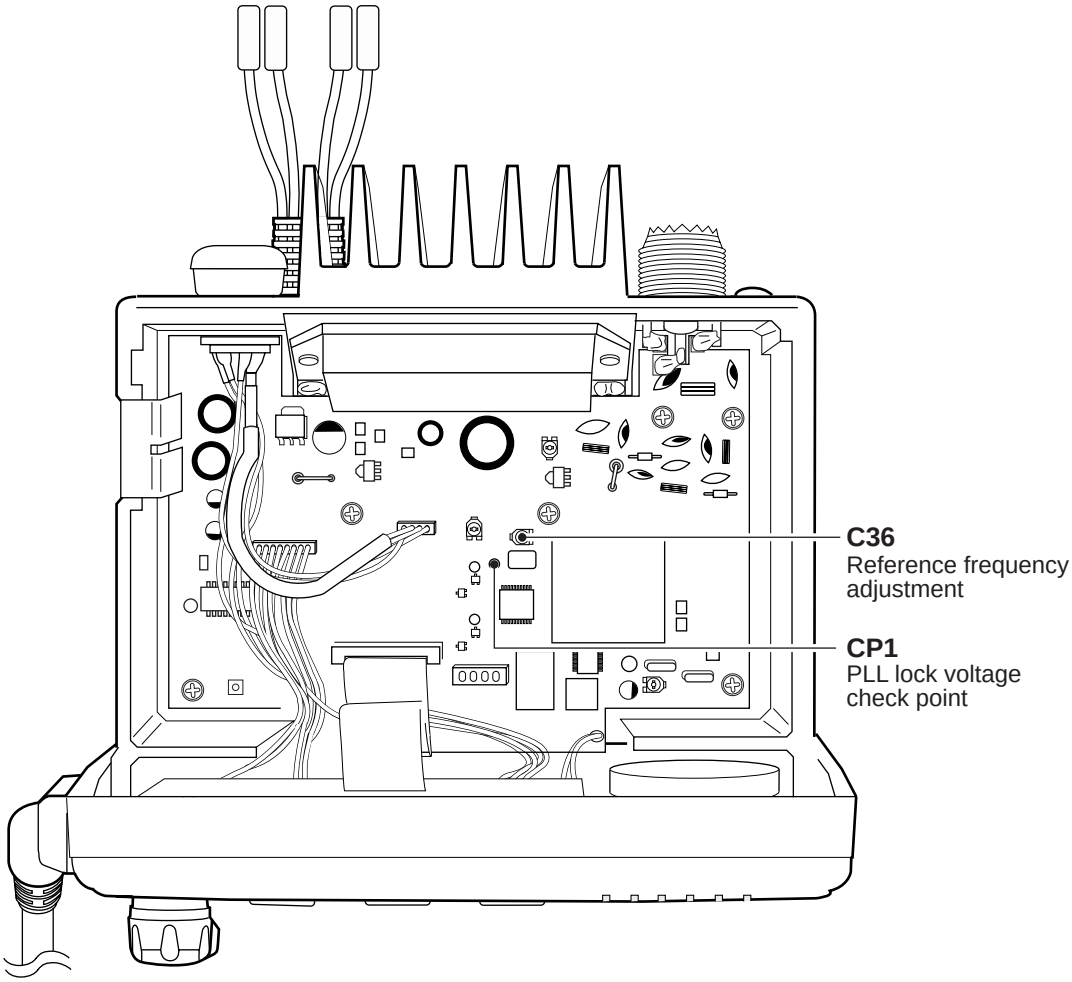
EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 13.8 V DC Current capacity : 10 A or more	Audio generator	Frequency range : 300–3000 Hz Measuring range : 1–500 mV
RF power meter (terminated type)	Measuring range : 1–50 W Frequency range : 100–300 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–300 MHz Output level : 0.1 µV–32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–300 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–20 V
FM deviation meter	Frequency range : 30–300 MHz Measuring range : 0 to ±10 kHz	AC millivoltmeter	Measuring range : 10 mV–10 V
DC voltmeter	Input impedance : 50 kΩ/V DC or better	External speaker	Input impedance : 4 Ω Capacity : 5 W or more
Digital multi-meter	Input impedance : 10 MΩ/V DC or better	Attenuator	Power attenuation : 40 or 50 dB Capacity : 50 W or more
Distortion meter	Frequency range : 1 kHz ±10 % Measuring range : 1–100 %	Dummy load	Resistance : 50 Ω Capacity : 100 W or more

■ CONNECTIONS



5-2 PLL ADJUSTMENTS

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
LOCK VOLTAGE	1	• Operating channel : ch16 • Receiving	MAIN	Connect a digital multi-meter or oscilloscope to the check point CP1.	1.8 V		Verify
	2	• Operating channel : ch16 • Output power : Low • Transmitting			1.6 V		
REFERENCE FREQUENCY	1	• Operating channel : ch16 • Output power : Low • Connect an RF power meter or a 50 Ω dummy load to the antenna connector. • Transmitting	Rear Panel	Loosely couple the frequency counter to the antenna connector.	156.8000 MHz	MAIN	C36



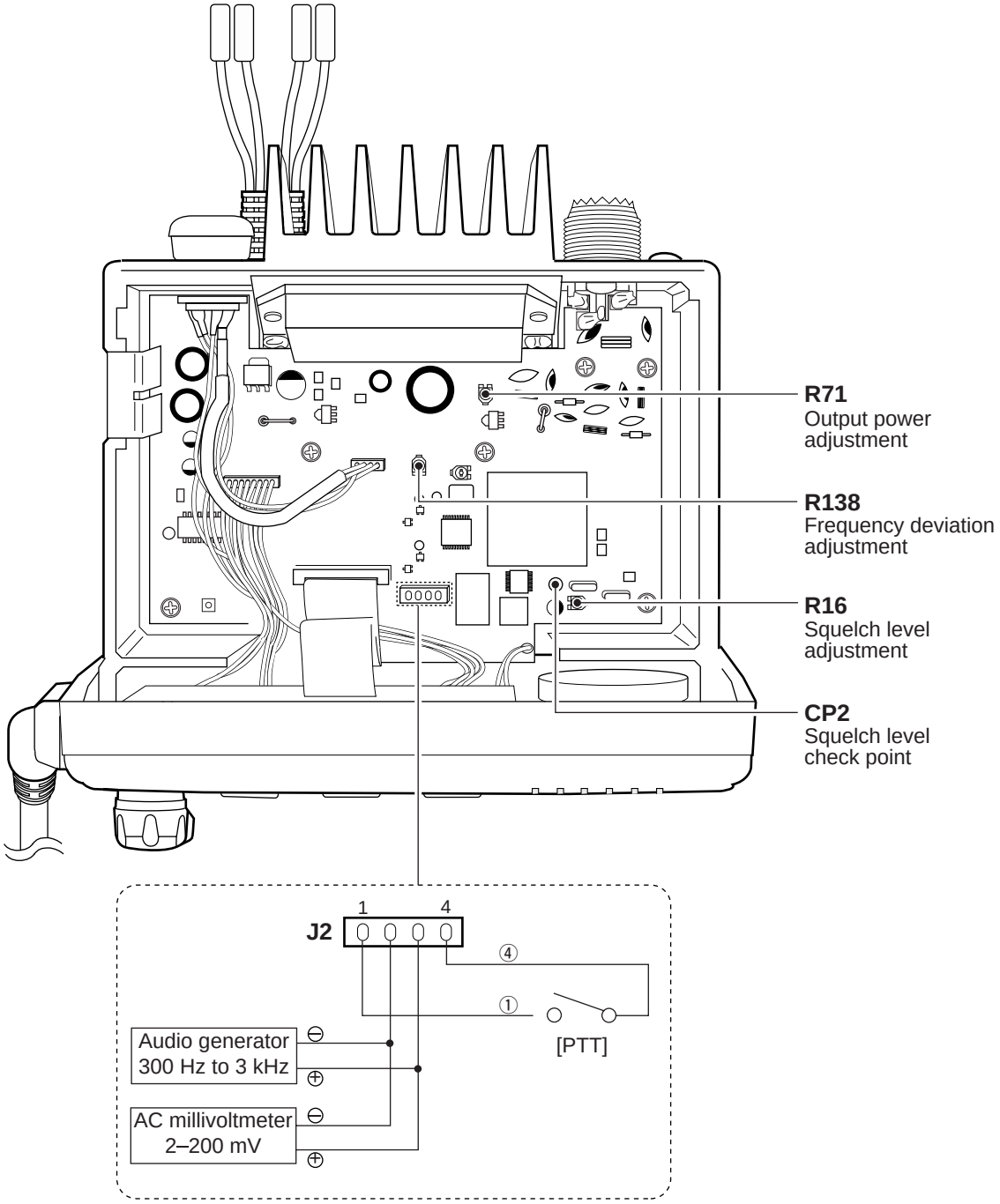
5-3 TRANSMITTER ADJUSTMENTS

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1	• Operating channel : ch16 • Output power : High • Transmitting	Rear Panel	Connect an RF power meter to the antenna connector.	26 W	MAIN	R71
FREQUENCY DEVIATION	1	• Operating channel : ch16 • Output power : Low • Connect an audio generator to J4 (pin 3) on the MAIN unit with an AC millivoltmeter and set as: Frequency : 1 kHz Level : 45 mV • Set an FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Transmitting	Rear Panel	Connect an FM deviation meter to the antenna connector through an attenuator.	±4.3 kHz	MAIN	R138

5-4 RECEIVER ADJUSTMENTS

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1	• Operating channel : ch16 • [SQUELCH] control: Max. counterclockwise • Connect an SSG to the antenna connector and set as: Frequency : 156.800 MHz Level : 100 µV* (–67 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz • Receiving	MAIN	Connect the distortion meter to the [EXT SP] jack with a 4 Ω load.	Less than 0.32 µV		Verify
SQUELCH	1	• Operating channel : ch16 • [SQUELCH] control: Max. counterclockwise • Connect an SSG to the antenna connector and set as: Frequency : 156.800 MHz Level : 0.22 µV* (–120 dBm) Modulation : 1 kHz Deviation : ±3.5 kHz • Receiving	MAIN	Connect a DC voltmeter to the check point CP2.	1.0 V	MAIN	R16

*This output level of a standard signal generator (SSG) is indicated as SSG's open circuit.


R71
Output power adjustment
R138
Frequency deviation adjustment
R16
Squelch level adjustment
CP2
Squelch level check point
J2
1
4
④
①
[PTT]
Audio generator
300 Hz to 3 kHz
AC millivoltmeter
2–200 mV

SECTION 6 PARTS LIST

6-1 IC-M402

[LOGIC BOARD]

REF NO.	ORDER NO.	DESCRIPTION	
IC1	1140009410	S.IC	HD6433847RA29H (FX-2438A)
IC2	1130009680	S.IC	HN58X2432TI
IC3	1130007570	S.IC	BU4094BCFV-E2
IC4	1130005290	S.IC	TC74HC14AF
IC5	1130006080	S.IC	TC74HC02AF (TP1)
IC6	1130009110	S.IC	S-80942ANMP-DD6-T2
IC7	1170000350	S.IC	PC357N6T
Q1	1590000720	S.TRANSISTOR	DTA144EUA T106
Q2	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)
Q3	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q4	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)
Q5	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q6	1590000680	S.TRANSISTOR	DTC114EUA T106
Q7	1510000510	S.TRANSISTOR	2SA1576A T106R
Q8	1560000810	S.FET	2SK1069-4-TL
Q9	1590001330	S.TRANSISTOR	DTA114EUA T106
Q10	1560000810	S.FET	2SK1069-4-TL
Q11	1560000810	S.FET	2SK1069-4-TL
D1	1750000550	S.DIODE	1SS355 TE-17
D2	1750000550	S.DIODE	1SS355 TE-17
X1	6050011090	S.XTAL	CR-691 (9.8304 MHz)
R1	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R2	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R3	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R4	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R5	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R6	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R7	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R8	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R9	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R10	7030003250	S.RESISTOR	ERJ3GEYJ 270 V (27 Ω)
R11	7030003250	S.RESISTOR	ERJ3GEYJ 270 V (27 Ω)
R12	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R13	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R14	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R15	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R16	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R17	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R18	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R19	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R20	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R21	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R22	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R26	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R34	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R35	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R36	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R39	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R41	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R42	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R43	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R44	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R45	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R46	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R47	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R50	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R51	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R52	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R53	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R54	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R55	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R56	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R57	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R58	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R59	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R60	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)

[LOGIC BOARD]

REF NO.	ORDER NO.	DESCRIPTION	
R61	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R62	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R63	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R64	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R65	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R66	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R67	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R68	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R69	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R70	7030003790	S.RESISTOR	ERJ3GEYJ 824 V (820 kΩ)
R71	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R72	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R73	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R74	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R75	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R76	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R77	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R78	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R79	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R80	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R81	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R82	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R83	7030003250	S.RESISTOR	ERJ3GEYJ 270 V (27 Ω)
R84	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R85	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R86	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R87	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
C1	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C2	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C3	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C4	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C5	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C6	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C7	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C8	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C9	4030006880	S.CERAMIC	C1608 JB 1H 472K-T-A
C10	4030008890	S.CERAMIC	C1608 JB 1C 273K-T-A
C11	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C12	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C13	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C14	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C18	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C20	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C21	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C22	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C23	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C24	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A
C25	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C26	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C27	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C28	4030009650	S.CERAMIC	C1608 CH 1H 240J-T-A
C29	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR
C30	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C31	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
J1	6510015540	S.CONNECTOR	B4B-ZR-SM3-TF
J2	6510018960	S.CONNECTOR	B2B-PH-SM3-TB
J3	6510018960	S.CONNECTOR	B2B-PH-SM3-TB
J4	6510022470	S.CONNECTOR	40FLT-SM1-TB
DS1	5030001950	LCD	TTR5341
DS3	5040002310	S.LED	SML-311YTT86
DS4	5040002310	S.LED	SML-311YTT86
DS5	5040002310	S.LED	SML-311YTT86
DS6	5040002310	S.LED	SML-311YTT86
DS7	5040002660	S.LED	FY1101F-TR (LED)
DS8	5040002660	S.LED	FY1101F-TR (LED)

S.=Surface mount

[LOGIC BOARD]

REF NO.	ORDER NO.	DESCRIPTION	
EP1	0910053453	PCB	B 5584C
EP2	8930054970	LCD CONTACT	SRCN-2438-SP-N-W

[VR-A BOARD]

REF NO.	ORDER NO.	DESCRIPTION	
R1	7210002350	VARIABLE	TP96N97N15F-10KA-1301
W1	8900010510	CABLE	OPC-1044
EP1	0910053462	PCB	B 5585B

[VR-B BOARD]

REF NO.	ORDER NO.	DESCRIPTION	
R1	7210002360	VARIABLE	TP96N97-15F-10KB-1301
EP1	0910053472	PCB	B 5586B

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
IC1	1110003200	S.IC	TA31136FN (EL)
IC2	1130007610	S.IC	µPD3140GS-E1 (DS8)
IC3	1150001540	IC	M57710-A/SC-1302
IC4	1130008090	S.IC	BU4066BCFV-E1
IC5	1130008090	S.IC	BU4066BCFV-E1
IC6	1110003650	S.IC	NJM2211M-TE1
IC7	1110002680	S.IC	NJM2902M-T1
IC8	1180001070	S.IC	TA7805F (TE16L)
IC9	1110003090	IC	LA4425A
Q1	1580000660	S.FET	3SK272-(TX)
Q2	1530002360	S.TRANSISTOR	2SC2714-Y (TE85R)
Q3	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)
Q4	1590000430	S.TRANSISTOR	DTC144EUA T106
Q5	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q6	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q7	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q8	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q9	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q10	1530002240	S.TRANSISTOR	2SC3775-3-TB
Q11	1530003710	S.TRANSISTOR	2SC3268 (TE12L)
Q12	1520000380	TRANSISTOR	2SB1143 S
Q14	1590000430	S.TRANSISTOR	DTC144EUA T106
Q15	1590000670	S.TRANSISTOR	FMW1 T148
Q16	1590000430	S.TRANSISTOR	DTC144EUA T106
Q17	1540000550	S.TRANSISTOR	2SD1664 T100Q
Q18	1590000430	S.TRANSISTOR	DTC144EUA T106
Q19	1590000720	S.TRANSISTOR	DTA144EUA T106
Q20	1560000810	S.FET	2SK1069-4-TL
Q21	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)
Q22	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)
Q23	1590000430	S.TRANSISTOR	DTC144EUA T106
Q24	1510000670	S.TRANSISTOR	2SA1588-GR (TE85R)
Q25	1590000430	S.TRANSISTOR	DTC144EUA T106
Q26	1590000430	S.TRANSISTOR	DTC144EUA T106
Q27	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q28	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
D1	1790000620	S.DIODE	MA77 (TX)
D2	1790000620	S.DIODE	MA77 (TX)
D3	1720000370	S.VARICAP	HVU350TRF
D4	1720000370	S.VARICAP	HVU350TRF
D5	1790000620	S.DIODE	MA77 (TX)
D6	1790000620	S.DIODE	MA77 (TX)
D7	1750000550	S.DIODE	1SS355 TE-17
D8	1790000690	S.DIODE	HSM88ASR-TR
D9	1790000690	S.DIODE	HSM88ASR-TR
D10	1710001080	DIODE	XB15A308
D11	1790000700	DIODE	DSA3A1
D12	1750000550	S.DIODE	1SS355 TE-17
D14	1750000130	S.DIODE	DA204U T107
D15	1710001080	DIODE	XB15A308
D16	1790001210	S.DIODE	1SS375-TL
D19	1790000620	S.DIODE	MA77 (TX)
D20	1790000620	S.DIODE	MA77 (TX)
D21	1790000660	S.DIODE	MA728 (TX)
FI1	2010002420	MONOLITH	21R15AB (FL-310)
FI2	2010002420	MONOLITH	21R15AB (FL-310)
FI3	2020001680	CERAMIC	ALFY450E
X1	6070000210	S.DISCRIMINATOR	CDBCA450CX24
X2	6050010800	S.XTAL	CR-659 (21.25 MHz)
L1	6200003050	S.COIL	NL 322522T-R82J-3
L2	6200002410	S.COIL	NL 252018T-056J
L3	6200002430	S.COIL	NL 252018T-082J
L4	6200003090	S.COIL	NL 322522T-2R7J-3
L5	6200008190	S.COIL	0.25-1.9-8TL 80N
L6	6200009180	S.COIL	ELJRE R10J-F3
L7	6200009180	S.COIL	ELJRE R10J-F3
L8	6200009180	S.COIL	ELJRE R10J-F3
L9	6200002430	S.COIL	NL 252018T-082J
L10	6200002430	S.COIL	NL 252018T-082J
L11	6170000230	COIL	LW-25
L12	6110001600	COIL	LA-243
L13	6110001600	COIL	LA-243
L14	6110001670	COIL	LA-253
L15	6110001600	COIL	LA-243
L16	6200007760	S.COIL	LQN21A 82NJ04
L17	6200007760	S.COIL	LQN21A 82NJ04
L19	6200007760	S.COIL	LQN21A 82NJ04
L20	6200007760	S.COIL	LQN21A 82NJ04
L21	6200007760	S.COIL	LQN21A 82NJ04
L22	6200007760	S.COIL	LQN21A 82NJ04
L24	6200007760	S.COIL	LQN21A 82NJ04
L25	6200007760	S.COIL	LQN21A 82NJ04
L26	6200004720	S.COIL	MLF1608D R10K-T
L27	6200003550	S.COIL	MLF1608A 4R7K-T
L28	6200009150	S.COIL	ELJRE 82NJ-F3
L29	6200009170	S.COIL	ELJRE 47NJ-F2
L30	6200002600	S.COIL	NL 252018T-047J
L31	6200002600	S.COIL	NL 252018T-047J
R3	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R5	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R6	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R7	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R8	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R9	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R10	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R11	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R12	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R13	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R14	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R15	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R16	7310002760	S.TRIMMER	RV-152 (RH03A3AJ4X0HA) 223
R17	7510001050	S.THERMISTOR	NTCCM1608 4LH 333KC-T
R18	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R19	7030003430	S.RESISTOR	ERJ3GEYJ 821 V (820 Ω)
R20	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R21	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R22	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R25	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R26	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R27	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R28	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R29	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R30	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R31	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R32	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R33	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R34	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R35	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R36	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R37	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R38	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R39	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R40	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R41	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R42	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R43	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R44	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R45	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R46	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)
R47	7030003420	S.RESISTOR	ERJ3GEYJ 681 V (680 Ω)
R48	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R49	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R50	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R51	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R52	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R53	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R54	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R56	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R57	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R58	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R59	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R60	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R61	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R62	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R63	7030000960	S.RESISTOR	MCR18EZHJ 33 Ω
R64	7030000960	S.RESISTOR	MCR18EZHJ 33 Ω
R65	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R66	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R67	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R68	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R69	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R70	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R71	7310002670	S.TRIMMER	RV-143 (RH03A3AS2) 471
R73	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R74	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R75	7030000240	S.RESISTOR	MCR10EZHJ 68 Ω (680)
R76	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R77	7030000240	S.RESISTOR	MCR10EZHJ 68 Ω (680)
R78	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R79	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R80	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R81	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R82	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R83	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R84	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R85	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R86	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R87	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R88	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R89	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R90	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R91	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R92	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R93	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R94	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R95	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R96	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R97	7030003390	S.RESISTOR	ERJ3GEYJ 391 V (390 Ω)
R98	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R99	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R100	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R101	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R102	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R103	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R104	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R105	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R106	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R107	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R108	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R109	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R110	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R111	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R112	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R113	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R121	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R122	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R123	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R124	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R125	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R126	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R127	7030003770	S.RESISTOR	ERJ3GEYJ 564 V (560 kΩ)
R128	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R129	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R130	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R131	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R132	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R133	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R134	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R135	7510001150	S.THERMISTOR	NTCCM1608 4BH 103KC
R136	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R137	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R138	7310002600	S.TRIMMER	RV-110 (RH03A3AS4X0AA) 473
R139	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R140	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R141	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R142	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R143	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R144	7030001070	S.RESISTOR	MCR50JZHJ 33 Ω (330)
R145	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R146	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R147	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R148	7030003480	S.RESISTOR	ERJ3GEYJ 222 V (2.2 kΩ)
R149	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R150	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R151	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R152	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R154	7030000100	S.RESISTOR	MCR10EZHJ 4.7 Ω (4R7)
R155	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R157	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R158	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)
R159	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R160	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R161	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R162	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R163	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R165	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R166	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R167	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R168	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R169	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R170	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R183	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R185	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R186	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R187	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R188	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R190	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R191	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R192	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R193	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R194	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R195	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R196	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R198	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R199	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R201	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
C3	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A
C4	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C5	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C6	4030007110	S.CERAMIC	C1608 CH 1H 680J-T-A
C7	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C9	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C10	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C11	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C12	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C14	4030011770	S.CERAMIC	C1608 CH 1H 060B-T-A
C16	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A
C17	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C18	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C19	4030011810	S.CERAMIC	C1608 JB 1A 224K-T-N
C20	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C21	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C22	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C23	4030011810	S.CERAMIC	C1608 JB 1A 224K-T-N
C24	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C25	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C26	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C27	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C28	4030007170	S.CERAMIC	C1608 CH 1H 221J-T-A
C29	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C30	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C31	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C33	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C34	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C35	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C36	4610001590	S.TRIMMER	TZC03R100A110 10P
C37	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C38	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C39	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C40	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C41	4550006810	S.TANTALUM	ECST1VY473R
C42	4550006560	S.TANTALUM	ECST1CY225R
C43	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C44	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C45	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C46	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C47	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C48	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C49	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C50	4550006360	S.TANTALUM	ECST1VY104R
C51	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C52	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C53	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C54	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A
C55	4030009540	S.CERAMIC	C1608 CH 1H 1R5B-T-A
C56	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C57	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C58	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C59	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C60	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C61	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C62	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C63	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C64	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C65	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C66	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C67	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C68	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C70	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C71	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C72	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C73	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C74	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C75	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C76	4030009500	S.CERAMIC	C1608 CH 1H 0R5B-T-A
C77	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C78	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C79	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C80	4510007630	ELECTROLYTIC	35 MV 47 CA
C81	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C82	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C83	4510004600	ELECTROLYTIC	16 MV 1000 HC
C84	4510004440	S.ELECTROLYTIC	ECEV1HA010SR
C85	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C86	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C87	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C88	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C89	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C90	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C91	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C92	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C93	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C94	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C95	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C96	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C97	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C98	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C99	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C100	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C101	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C102	4010008530	CERAMIC	HM74SJ CH 360J 500V
C103	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C104	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C105	4010007630	CERAMIC	HM60SJ CH 270J 500V
C106	4010005790	CERAMIC	HM60SJ YB 102K 500V
C107	4010005500	CERAMIC	HM60SJ CH 150J 500V
C108	4010005430	CERAMIC	HM60SJ CH 050C 500V
C109	4010008540	CERAMIC	HM60SJ CH 240J 500V
C111	4010005420	CERAMIC	HM60SJ CH 040C 500V
C112	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C113	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C114	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C115	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C116	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C118	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C120	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C121	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C122	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C123	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C124	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C125	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C126	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C127	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C128	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C129	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR
C130	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR
C131	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C132	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C133	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C134	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C135	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C136	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR
C137	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C138	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A
C139	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A
C140	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C141	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C142	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C143	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C144	4030009880	S.CERAMIC	C1608 JB 1H 682K-T-A
C145	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C146	4030011810	S.CERAMIC	C1608 JB 1A 224K-T-N
C147	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C148	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C149	4340000020	S.MYLAR	ECWU 1C 333JB5
C150	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A
C151	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C152	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C155	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C156	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C159	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C160	4030011280	S.CERAMIC	C1608 CH 1H 271J-T-A
C161	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C162	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C164	4030009490	S.CERAMIC	C1608 JB 1H 821K-T-A
C165	4030006880	S.CERAMIC	C1608 JB 1H 472K-T-A
C166	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A
C168	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C169	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C170	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C171	4510006220	S.ELECTROLYTIC	ECEV1CA101UP
C172	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C173	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C174	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C175	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C176	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C177	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C178	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C179	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C180	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C181	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR
C182	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C183	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C184	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C185	4510004590	ELECTROLYTIC	16 MV 470 HC
C186	4510004590	ELECTROLYTIC	16 MV 470 HC
C187	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C188	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C189	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C190	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C191	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C192	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C193	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C194	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C195	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C196	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C197	4010007630	CERAMIC	HM60SJ CH 270J 500V
C198	4010008530	CERAMIC	HM74SJ CH 360J 500V
C199	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C200	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C201	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C202	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C203	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C204	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C206	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C207	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C208	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C209	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C210	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C211	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C212	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C213	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C214	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C215	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C216	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C217	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C218	4030009510	S.CERAMIC	C1608 CH 1H 010B-T-A
C220	4030009520	S.CERAMIC	C1608 CH 1H 020B-T-A
C221	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C222	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C223	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C224	4030009920	S.CERAMIC	C1608 CH 1H 050B-T-A
C225	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
C226	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C227	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C228	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C229	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A
C230	4030008880	S.CERAMIC	C1608 JB 1C 223K-T-A
C231	4030009880	S.CERAMIC	C1608 JB 1H 682K-T-A
C245	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C246	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A
C249	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C251	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C252	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C253	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C254	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C255	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C256	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C257	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C258	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C259	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C260	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C261	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C262	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C264	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C265	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C266	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C267	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C268	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C270	4030007080	S.CERAMIC	C1608 CH 1H 390J-T-A
C271	4030007040	S.CERAMIC	C1608 CH 1H 180J-T-A
C272	4550006700	S.TANTALUM	ECST1AY106R
C273	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C274	4030008870	S.CERAMIC	C1608 JB 1C 183K-T-A
C275	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C276	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C277	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
J2	6510015540	S.CONNECTOR	B4B-ZR-SM3-TF
J4	6510018970	S.CONNECTOR	B4B-PH-SM3-TB
J5	6510019420	S.CONNECTOR	B8B-ZR-SM3-TF
J6	6510022470	S.CONNECTOR	40FLT-SM1-TB
W1	7120000470	JUMPER	ERDS2T0
W6	7030003860	S.JUMPER	ERJ3GE JPW V
EP1	0910053443	PCB	B 5583C

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
MC1	0800005970	MICROPHONE	HM-129B ACC <KN>
MC1	0800005980	MICROPHONE	HM-129W ACC <KN>
SP1	2510001110	SPEAKER	045P1601 <KS>
W1	7120000470	JUMPER	ERDS2T0
W2	7120000470	JUMPER	ERDS2T0
W3	8900010500	CABLE	OPC-1046

S.=Surface mount

6-2 MH-127

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
IC1	1140009280	S.IC	µPD78F9418AGK-9EU (FX-2345D)
IC2	1110001810	S.IC	TA7368F (TP1)
IC3	1110004490	S.IC	M62429FP 700C
IC4	1120002830	S.IC	NJM2125F-TE1
IC5	1180000420	S.IC	TA78L05F (TE12R)
IC6	1180001250	S.IC	TA7808F (TE16L)
IC7	1110004710	S.IC	S-80928ANMP-DDR-T2
IC8	1130007420	S.IC	TC7W14FU (TE12L)
IC9	1130006220	S.IC	TC4W53FU (TE12L)
Q1	1560000810	S.FET	2SK1069-4-TL
Q2	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q3	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)
Q4	1590001390	S.FET	2SJ144-Y (TE85R)
Q5	1590000430	S.TRANSISTOR	DTC144EUA T106
Q6	1590000980	S.TRANSISTOR	DTB123EK T147
Q9	1560000810	S.FET	2SK1069-4-TL
Q10	1530002060	S.TRANSISTOR	2SC4081 T107 R
Q11	1510000510	S.TRANSISTOR	2SA1576A T106R
Q12	1530002850	S.TRANSISTOR	2SC4116-BL (TE85R)
D1	1750000130	S.DIODE	DA204U T107
D2	1160000060	S.DIODE	DAN202U T107
D3	1750000550	S.DIODE	1SS355 TE-17
X1	6060000750	S.CERAMIC	CSTCC4.91MG
R1	7030000270	S.RESISTOR	MCR10EZHJ 120 Ω (121)
R2	7030000270	S.RESISTOR	MCR10EZHJ 120 Ω (121)
R3	7030000280	S.RESISTOR	MCR10EZHJ 150 Ω (151)
R6	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R7	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R8	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R9	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R10	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R11	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R12	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R13	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R14	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R15	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R16	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R17	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R18	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R19	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R20	7030003540	S.RESISTOR	ERJ3GEYJ 682 V (6.8 kΩ)
R21	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R22	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R23	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R24	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R25	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R26	7510001150	S.THERMISTOR	NTCCM1608 4BH 103KC
R27	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R28	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R29	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R30	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R31	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R32	7030004120	S.RESISTOR	ERJ3GEYJ 203 V (20 kΩ)
R33	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R34	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R35	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R36	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R37	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R38	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R39	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R40	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R41	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R42	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R43	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R44	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R45	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R46	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R47	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R50	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R51	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R52	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R53	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R54	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R55	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R56	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R57	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R58	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R59	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R60	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R61	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R62	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R63	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R64	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R65	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R66	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R67	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R68	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R69	7030003320	S.RESISTOR	ERJ3GEYJ 101 V (100 Ω)
R70	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R75	7030000180	S.RESISTOR	MCR10EZHJ 22 Ω (220)
R76	7030000180	S.RESISTOR	MCR10EZHJ 22 Ω (220)
R77	7030000180	S.RESISTOR	MCR10EZHJ 22 Ω (220)
C1	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C3	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C4	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C5	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C6	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C7	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C9	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C10	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C11	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C12	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A
C13	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C14	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C15	4510006220	S.ELECTROLYTIC	ECEV1CA101UP
C16	4510006220	S.ELECTROLYTIC	ECEV1CA101UP
C17	4510006220	S.ELECTROLYTIC	ECEV1CA101UP
C18	4510006250	S.ELECTROLYTIC	ECEV1CA331UP
C22	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C23	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C24	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A
C25	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C26	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A
C27	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C28	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C29	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C30	4510004630	S.ELECTROLYTIC	ECEV1CA100SR
C31	4030011810	S.CERAMIC	C1608 JB 1A 224K-T-N
C32	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C33	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A
C34	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C35	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C36	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C37	4510005430	S.ELECTROLYTIC	ECEV0JA220SR
C38	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C39	4510006220	S.ELECTROLYTIC	ECEV1CA101UP
C40	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C41	4510006250	S.ELECTROLYTIC	ECEV1CA331UP
C42	4030008890	S.CERAMIC	C1608 JB 1C 273K-T-A
C44	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C45	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C46	4030011600	S.CERAMIC	C1608 JB 1C 104KT-N
C47	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C50	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C51	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C52	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C53	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C54	4030012600	S.CERAMIC	C2012 JB 1A 105M-T-A
J1	6510019420	S.CONNECTOR	B8B-ZR-SM3-TF
J2	6510021440	S.CONNECTOR	B6B-ZR-SM3-TF
DS1	5030001900	LCD	A0119 LCD36*28.5
DS2	5040002660	S.LED	FY1101F-TR (LED)
DS3	5040002660	S.LED	FY1101F-TR (LED)
DS4	5040002310	S.LED	SML-311YTT86
DS5	5040002660	S.LED	FY1101F-TR (LED)
DS6	5040002660	S.LED	FY1101F-TR (LED)

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
DS7	5040002310	S.LED	SML-311YTT86
DS8	5040002310	S.LED	SML-311YTT86
DS9	5040002310	S.LED	SML-311YTT86
DS10	5040002310	S.LED	SML-311YTT86
MC1	7700002480	MICROPHONE	SKB-2746 LPC
S1	2260002140	S.SWITCH	SKQLLC
S2	2260002140	S.SWITCH	SKQLLC
S3	2260002140	S.SWITCH	SKQLLC
S4	2260002140	S.SWITCH	SKQLLC
EP1	0910053142	PCB	B 5526B
EP2	8930051120	LCD CONTACT	SRCN-2320-SP-N-W

6-3 MH-129
[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R1	7010006890	RESISTOR	R20J 12 K Ω
R2	7010006880	RESISTOR	R20J 6.8K Ω
R3	7010006900	RESISTOR	R20J 15 K Ω
R4	7010006910	RESISTOR	R20J 33 K Ω
C1	4010008030	CERAMIC	DD104 B 471K 50V
MC1	7700002500	MICROPHONE	KUC3523-040245 <KN>
S1	2260002330	SWITCH	SKHHLP014A
S2	2260002340	SWITCH	SKHHAM024A
S3	2260002340	SWITCH	SKHHAM024A
S4	2260002340	SWITCH	SKHHAM024A
W1	9018490010	WIRE	71/98/010/X98/X98 <KN>
W2	9018490010	WIRE	71/98/010/X98/X98 <KN>
EP1	0910053701	PCB	B-5587A

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 IC-M402

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
J1	6510004880	Connector MR-DSE-01		1
W1	8900010470	Cable OPC-1029 (incl. nut, packing)		1
W2	8900010480	Cable OPC-1040		1
MP2	8010018470	2438 Chassis		1
MP3	8930052440	2345 B-IC clip		1
MP4	8510013700	2438 Case	[BLACK]	1
	8510013850	2438 Case (A)	[WHITE]	1
MP5	8930054660	2438 R-PACKING		1
MP6	8930045280	2040 F-PACKING		1
MP7	8930034300	1542 ANT SEAL		1
MP8	8930054620	2438 B-Bush plate		1
MP9	8830001530	2438 MB nut		2
MP10	8510011870	2040 MODULE cover		1
MP11	8930055070	2438 SHEET		1
MP12	8930053740	O ring		2
MP13	8930052290	O ring		6
MP14	8810008680	Screw PH M3x8 NI		4
MP15	8810008660	Screw PH B0 M3x8 NI-ZU (BT)		6
MP16	8810008660	Screw PH B0 M3x8 NI-ZU (BT)		2
MP17	8810002950	Screw BiH M3x6 SUS		2
MP18	8810006050	Screw E7		6
MP19	8850000690	Flat washer M3 SUS		6
MP20	8930055040	2438 cap		1
MP21	8930049040	Insulating plate		1

[FRONT UNIT]

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
MC1	0800005970	Microphone HM-129B	[BLACK]	1
	0800005980	Microphone HM-129W	[WHITE]	1
SP1	2510001110	Speaker 045P1601		1
W3	8900010500	Cable OPC-1046		1
MP1	8210017690	2438 Front panel	[BLACK]	1
	8210017770	2438 Front panel (A)	[WHITE]	1
MP2	8930054640	2438 Key board		1
MP3	8310050810	2438 Window plate		1
MP4	8610011030	Knob N-286	[BLACK]	2
	8610011040	Knob N-286 (A)	[WHITE]	2
MP5	8930014280	SP net		1
MP6	8810008660	Screw PH B0 M3x8 NI-ZU (BT)		4
MP7	8830001350	Sonicrock SL-M3-5.8		4
MP8	8930052010	2345 Shaft		1
MP9	8930052030	2345 Spring		1
MP10	8110007460	2438 D-cover		1
MP11	8930052020	2345 Shaft angle		1
MP12	8930052280	O ring (AC)		2
MP13	8310051220	2438 C-Bush plate		1
MP14	8610009240	Knob spring		1

[LOGIC BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
DS1	5030001950	LCD TTR5341	1
EP2	8930054970	LCD contact SRCN-2438-SP-N-W	2
MP1	8210017700	2438 Reflector	1
MP2	8930054650	2438 LCD holder	1
MP3	8930055060	2438 White sheet	1

[VR-A BOARD]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210002350	TP96N97N15F-10KA-1301 (incl. nut)	1

[VR-B BOARD]

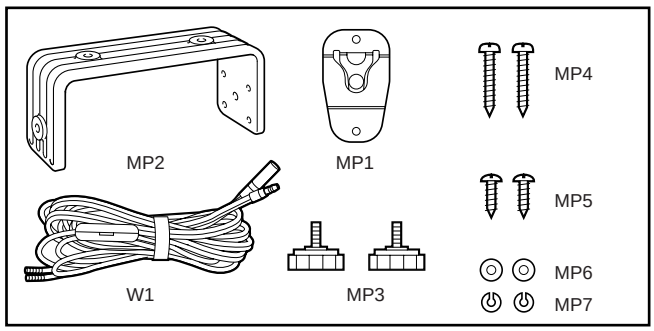
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R1	7210002360	TP96N97N15F-10KB-1301 (incl. nut)	1

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
IC3	1150001540	SC-1302	1
MP1	8510013860	2435 Shield case	1
MP2	8510013710	2438 Module plate	1
MP3	8510002280	VCO shield plate (A)	1
MP4	8930052270	Shield sponge (D)	1

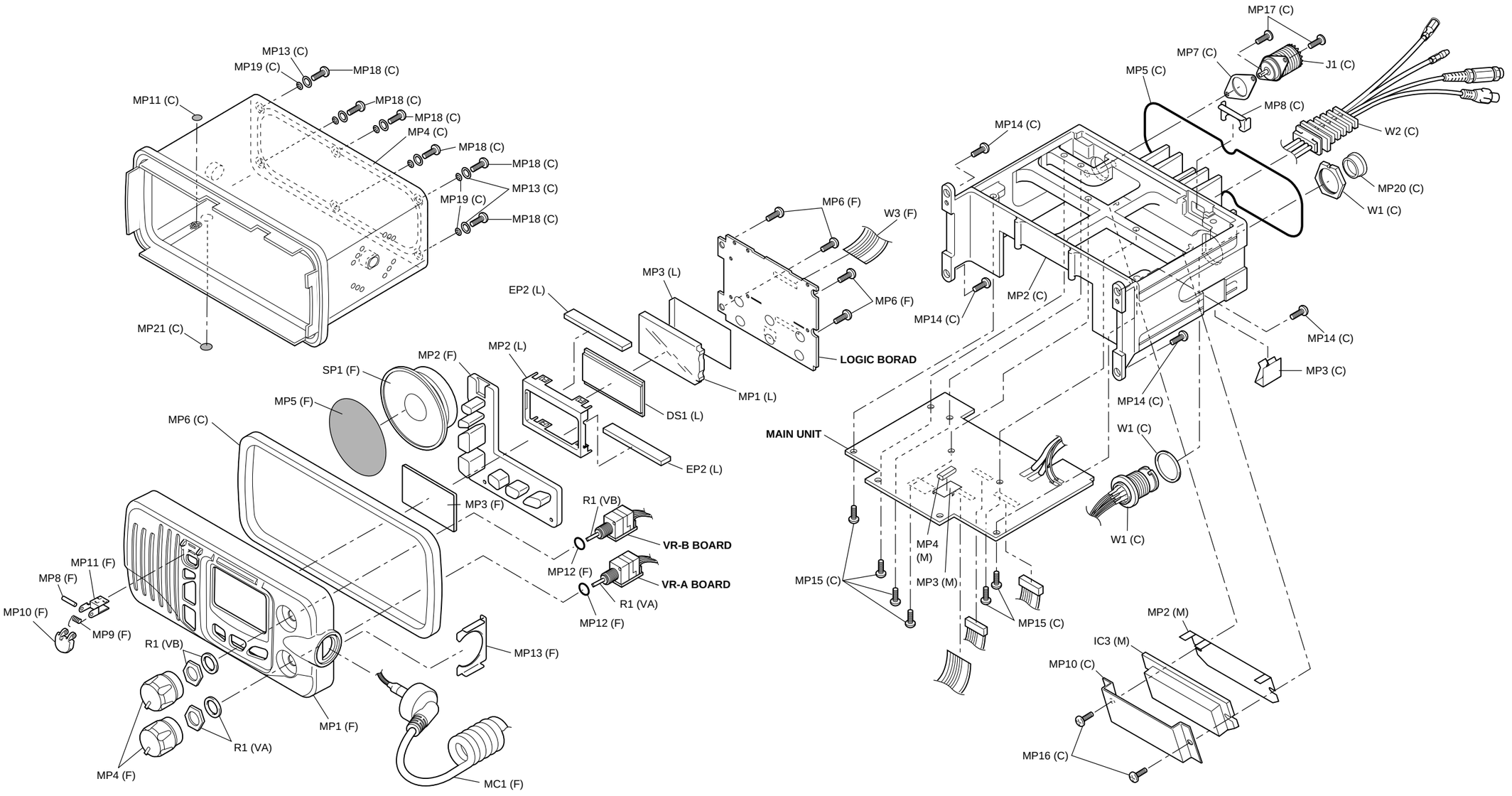
[ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
W1	8900009040	Cable OPC-891		1
MP1	8950005110	2289 MIC hanger		1
MP2	8010017250	2040 Mobile bracket	[BLACK]	1
	8010017270	2040 Mobile bracket (A)	[WHITE]	1
MP3	8610010560	2040 Knob bolt	[BLACK]	2
	8610010590	2040 Knob bolt (A)	[WHITE]	2
MP4	8810004700	Screw PH A0 M3x16 SUS		2
MP5	8810001490	Screw PH A0 M5x20 SUS		2
MP6	8850000180	Flat washer M5 SUS		2
MP7	8850000500	Spring washer M5 SUS		2



Screw abbreviations

A0, B0, BT: Self-tapping
PH: Pan head
BiH: Bind head
NI: Nickel
SUS: Stainless
NI-ZU: Nickel-Zinc



UNIT abbreviations (C): CHASSIS PARTS, (L): LOGIC BOARD, (M): MAIN UNIT
(VA): VR-A BOARD, (VB): VR-B BOARD, (F): FRONT UNIT

7-2 HM-129

[CHASSIS PARTS]

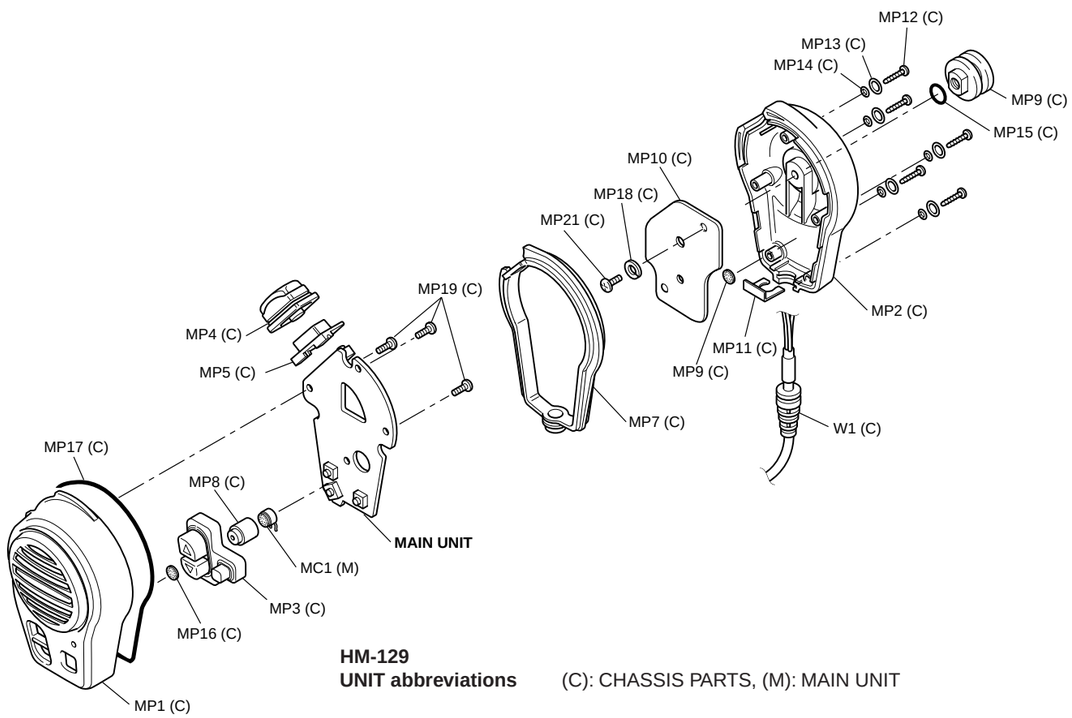
REF. NO.	ORDER NO.	DESCRIPTION		QTY.
W1	8900010450	Cable OPC-1034	[BLACK]	1
	8900010460	Cable OPC-1035	[WHITE]	1
MP1	8210017670	2352 front panel (B)-1	[BLACK]	1
	8210017680	2352 front panel (C)-1	[WHITE]	1
MP2	8210016850	2352 rear panel	[BLACK]	1
	8210017110	2352 rear panel (A)	[WHITE]	1
MP3	8930052160	2352 key		1
MP4	8930052150	2352 PTT rubber		1
MP5	8930052140	2352 PTT holder		1
MP6	8930052690	2352 MIC rubber		1
MP7	8930052120	2352 rubber		1
MP8	8930052110	2352 main seal		1
MP9	8610010870	2352 hanger knob		1
MP10	8310048760	2352 R-plate		1
MP11	8310048780	2352 MIC plate		1
MP12	8820001150	2352 screw		5
MP13	8850001850	ICOM washer (Y)		5
MP14	8930052340	O-ring (AE)		5
MP15	8930052350	O-ring (AF)		1
MP16	8930053870	2352 sheet (A)		1
MP17	8930054910	2449 SP Rubber		1
MP18	8850001610	Spring washer M4 SUS		1
MP19	8810009260	Screw PH B0 2 × 6 NI		3
MP21	8810009240	Screw BiH M4 × 10 ZK		1

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MC1	7700002500	Microphone KUC3523-040245	1

Screw and washer abbreviations

B0: Self-Tapping
NI: Nickel
ZK: Black
PH: Pan head
SUS: Stainless
BiH: Bind head



HM-129
UNIT abbreviations (C): CHASSIS PARTS, (M): MAIN UNIT

7-3 HM-127 (OPTIONAL UNIT)

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION		QTY.
W3	8900010220	Cable OPC-997	[BLACK]	1
	8900010230	Cable OPC-998	[WHITE]	1
SP1	2510001090	Speaker 036D0801		1
MP1	8210017261	2417 front panel-1	[BLACK]	1
	8210017291	2417 front panel (A)-1	[WHITE]	1
MP2	8310049820	2417 Window plate		1
MP3	8930053510	2417 key board		1
MP4	8930053540	2417 PTT rubber		1
MP5	8930053990	2417 PTT sheet		1
MP6	8930053550	2417 PTT holder		1
MP7	8930053520	2417 top key		1
MP8	8930053760	2417 key plate		1
MP9	8930011900	SP net (A)		1
MP10	8930039000	1757 sheet		1
MP11	8810009180	Screw FT B0 M2 × 5 NI-ZU		3
MP12	8930053750	2417 plate		1
MP13	8210017250	2417 rear panel	[BLACK]	1
	8210017300	2417 rear panel (A)	[WHITE]	1
MP14	8310049970	2417 R-plate		1
MP15	8610010980	2417 hanger knob		1
MP16	8930053740	O-ring (AJ)		1
MP17	8810008450	Screw BiH M4 × 8 ZK		1
MP18	8850000490	Spring washer M4 SUS		1
MP19	8930053530	2417 rubber		1
MP20	8820001180	2417 screw 2.6 × 16		6
MP21	8930053730	O-ring (AI)		6

[ACCESSORIES]

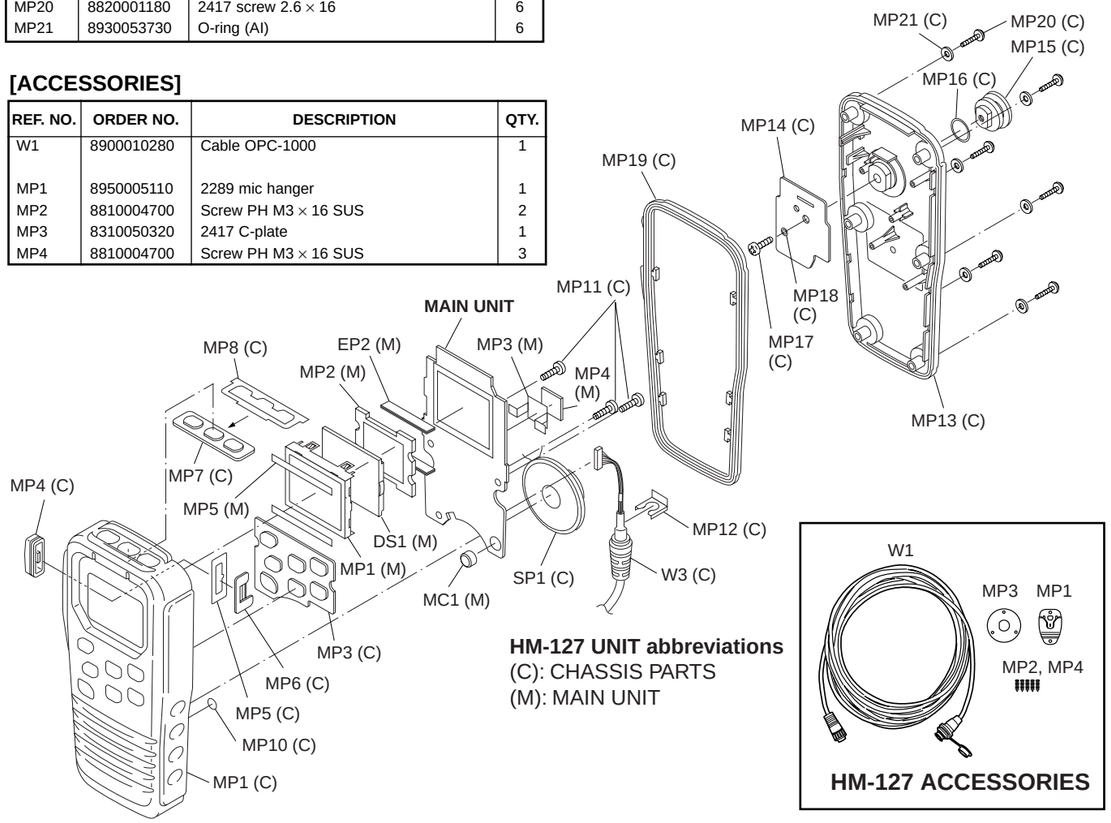
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
W1	8900010280	Cable OPC-1000	1
MP1	8950005110	2289 mic hanger	1
MP2	8810004700	Screw PH M3 × 16 SUS	2
MP3	8310050320	2417 C-plate	1
MP4	8810004700	Screw PH M3 × 16 SUS	3

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
DS1	5030001900	LCD A0119 (LCD 36 × 28.5)	1
EP2	8930051120	LCD contact SRCN-2320-SP-N-W	2
MC1	7700002480	Microphone SKB-2746 LPC	1
MP1	8930053780	2417 LCD holder	1
MP2	8210017240	2417 reflector	1
MP3	8310050200	2417 H-plate	1
MP4	8930039610	Thermally sheet (C)	1
MP5	8930054890	Insulate sheet (GM)	2

Screw and washer abbreviations

PH: Pan head
B0: Self-tapping
SUS: Stainless
BiH: Bind head
FT: Flat head
NI-ZU: Nickel-zinc
ZK: Black

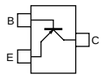
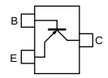
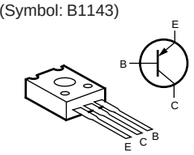
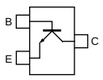
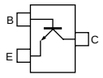
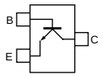
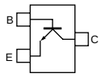
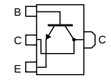
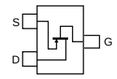
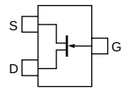
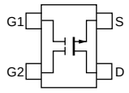
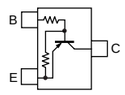
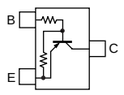
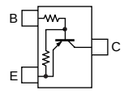
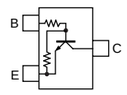
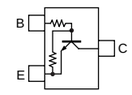


HM-127 UNIT abbreviations
(C): CHASSIS PARTS
(M): MAIN UNIT

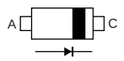
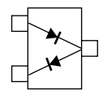
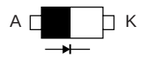
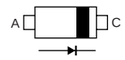
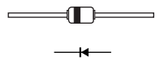
HM-127 ACCESSORIES

SECTION 8 SEMI-CONDUCTOR INFORMATION

• TRANSISTOR AND FET'S

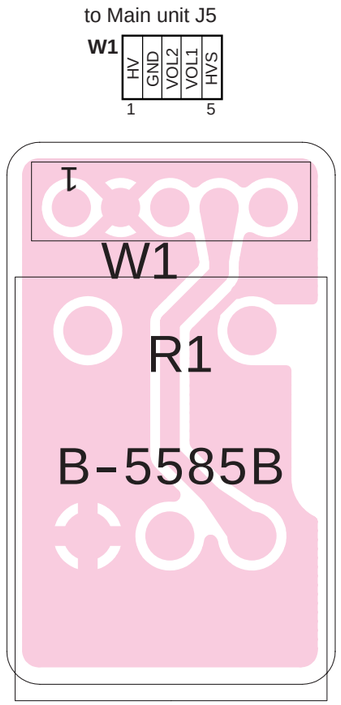
2SA1576 R (Symbol: FR) 	**2SA1588** (Symbol: ZG) 	**2SB1132 R** (Symbol: BAR) 	**2SB1143 S** (Symbol: B1143) 	**2SC2714 Y** (Symbol: QY) 
2SC3268 (Symbol: ME) 	**2SC3775 3** (Symbol: OY3) 	**2SC4081 R** (Symbol: BR) 	**2SC4116 BL** (Symbol: LL) 	**2SC4215 O** (Symbol: QO)
2SC4226 R25 (Symbol: R25) 	**2SD1664 Q** (Symbol: DAQ) 	**2SJ144 Y** (Symbol: VY) 	**2SK1069** (Symbol: FJ) 	**3SK272** (Symbol: DU) 
DTA114 EUA (Symbol: 14) 	**DTA144 EU** (Symbol: 16) 	**DTB123 EK** (Symbol: F12) 	**DTC114 EU** (Symbol: 24) 	**DTC144 EU** (Symbol: 26) 
FMW1 (Symbol: W1) 				

• DIODES

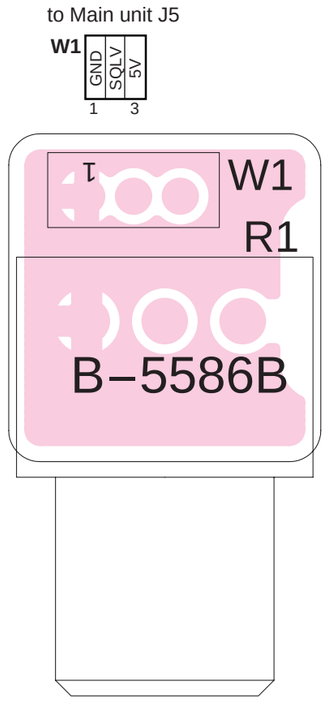
1SS355 (Symbol: A) 	**1SS375** (Symbol: FH) 	**DA204 U** (Symbol: K) 	**DAN202 U** (Symbol: N) 	**HSM88ASR** (Symbol: C3)
HVU350 (Symbol: 4) 	**MA77** (Symbol: 4B) 	**MA728** (Symbol: 2A) 	**XB15A308** (Symbol: T8) 	

SECTION 9 BOARD LAYOUTS

9-1 VR-A BOARD

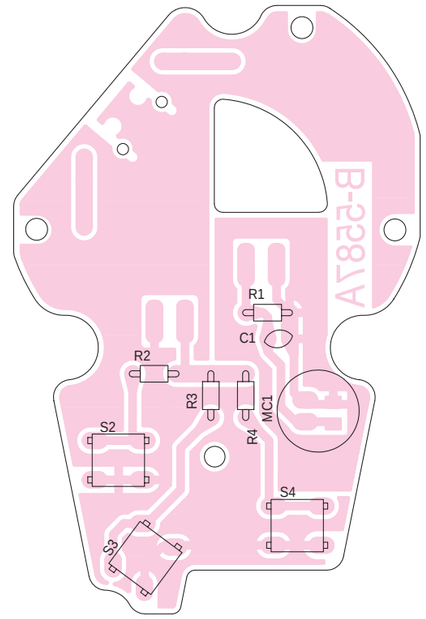


9-2 VR-B BOARD

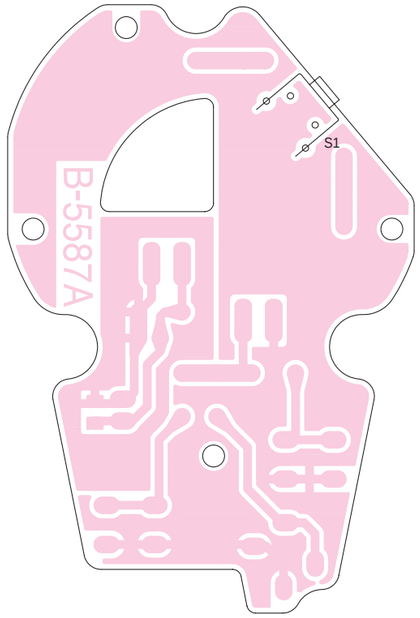


9-3 HM-129

● TOP VIEW

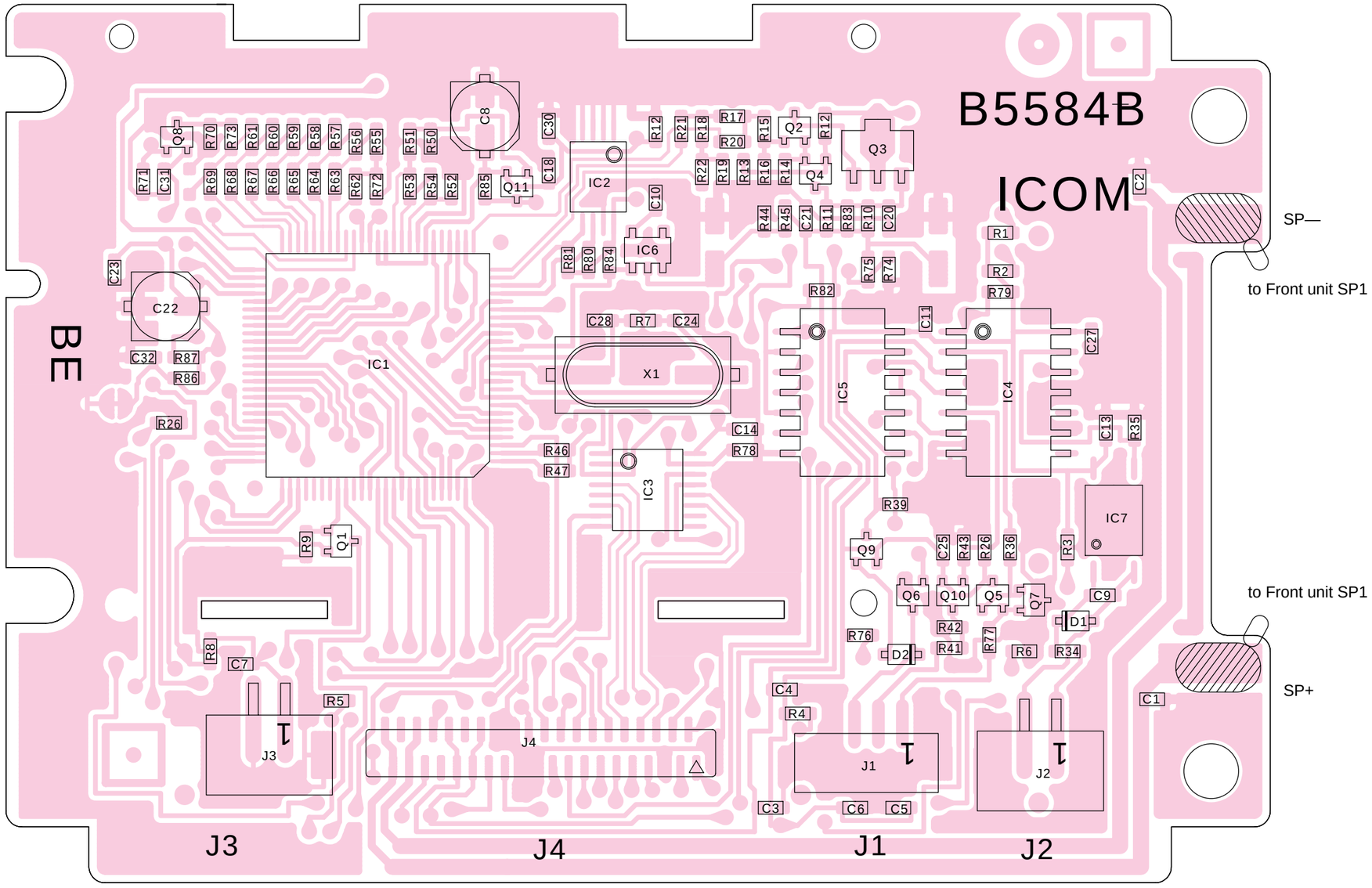


● BOTTOM VIEW



9-4 LOGIC BOARD

• **TOP VIEW**



J3

2	1
GND	KEYM

From Smart Mic HM-129

J4

40																			2
SP+	—	SP–	BPLVL	HVS	—	5V	GND	GND	TMUT	TXDET	HI/LO	SQLV	PTT	BPFV	RMUTS	SMUTE	SQL	UNLK	PSTB
SP+	SP–	BEEPM	—	HVS	5V	RCV	SEND	GND	GND	DSENC	DSDEC	WXDEC	PTTS	PTTM	RMUTM	MMUTE	GND	PDATA	PCK
39																			1

From/to Main unit J6

J1

4			1
GND	ICF3	CLDA	LCDA

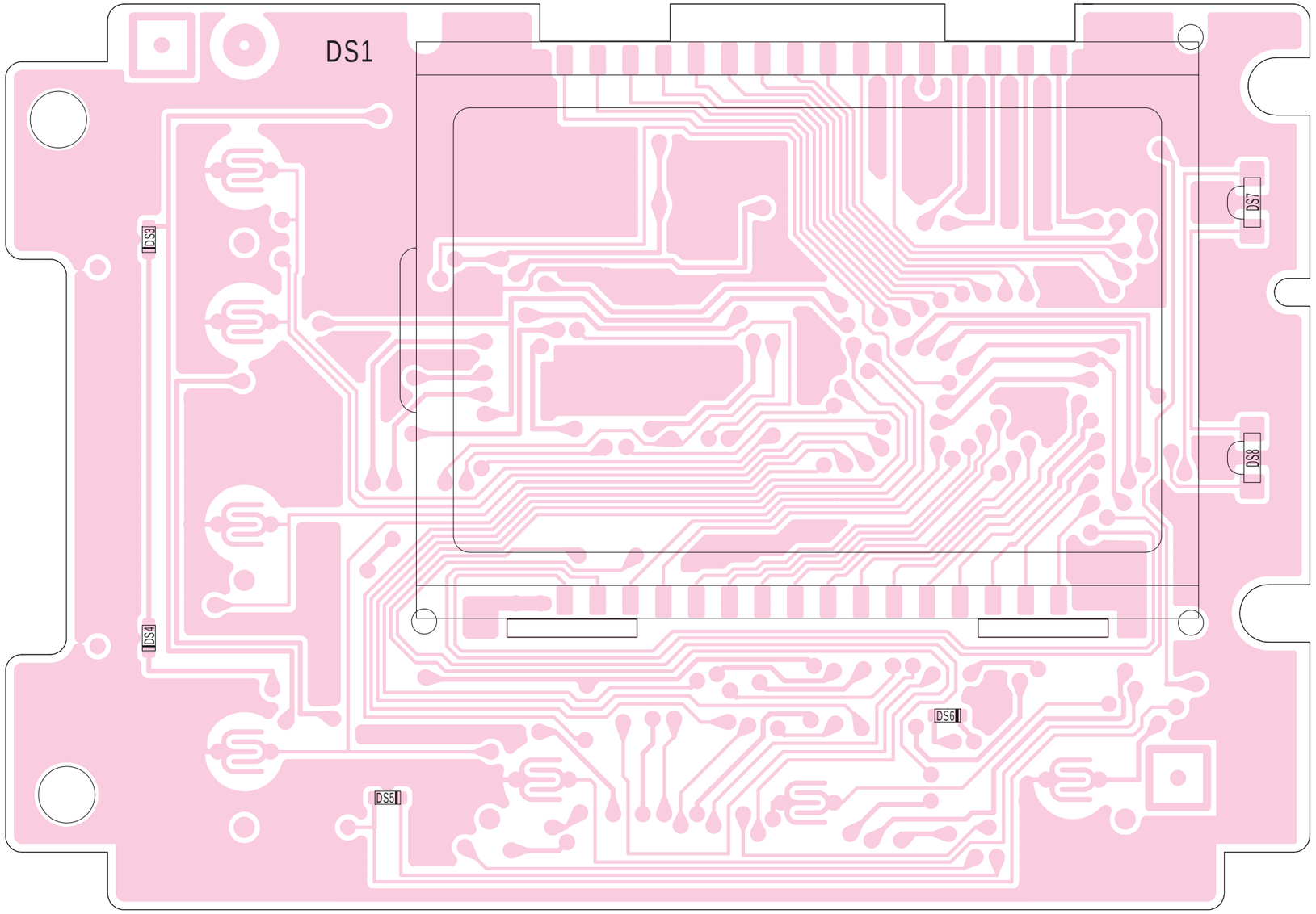
From/to Remoto Mic HM-127

J2

2	1
NMEA–	NMEA+

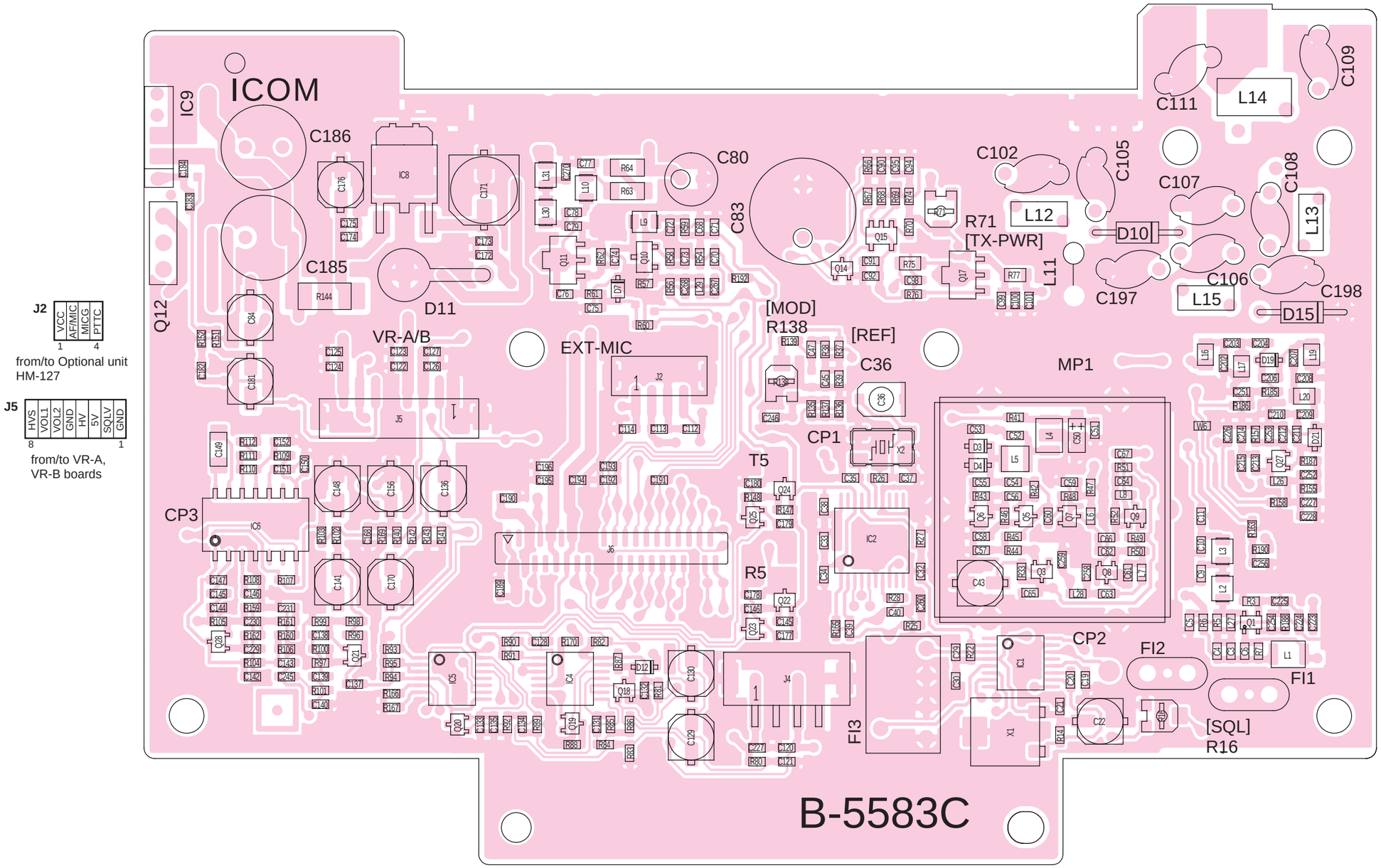
From External GPS

• **BOTTOM VIEW**



9-5 MAIN UNIT

• TOP VIEW



J2

1	2	3	4
VCC	AF/MIC	MICG	PTTC

from/to Optional unit HM-127

J5

8	7	6	5	4	3	2	1
HVS	VOL1	VOL2	GND	HV	5V	SQLV	GND

from/to VR-A, VR-B boards

J6

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SP+	SP−	SP−	BPLVL	HVS	—	5V	GND	GND	TMUT	TXDET	HI/LO	SQLV	PTT	BPFV	RMUTS	SMUTE	SQL	UNLK	PSTB
SP+	SP−	BEEPM	—	HVS	5V	RCV	SEND	GND	GND	DSENC	DSDEC	WXDEC	PTTS	PTTM	RMUTM	MMUTE	GND	PDATA	PCK

39 40

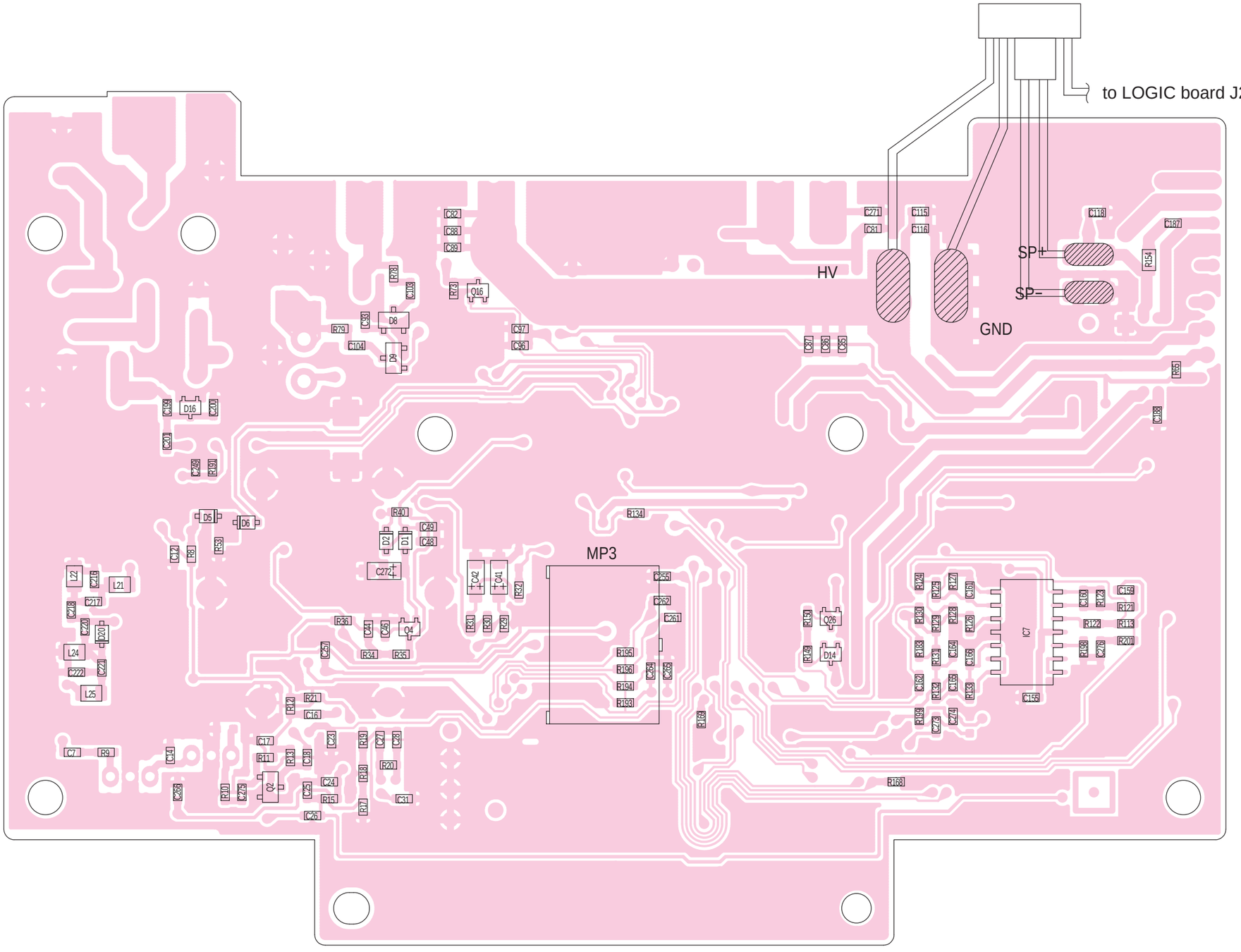
to Logic unit J4

J4

1	2	3	4
PTT	MICG	MIC	GND

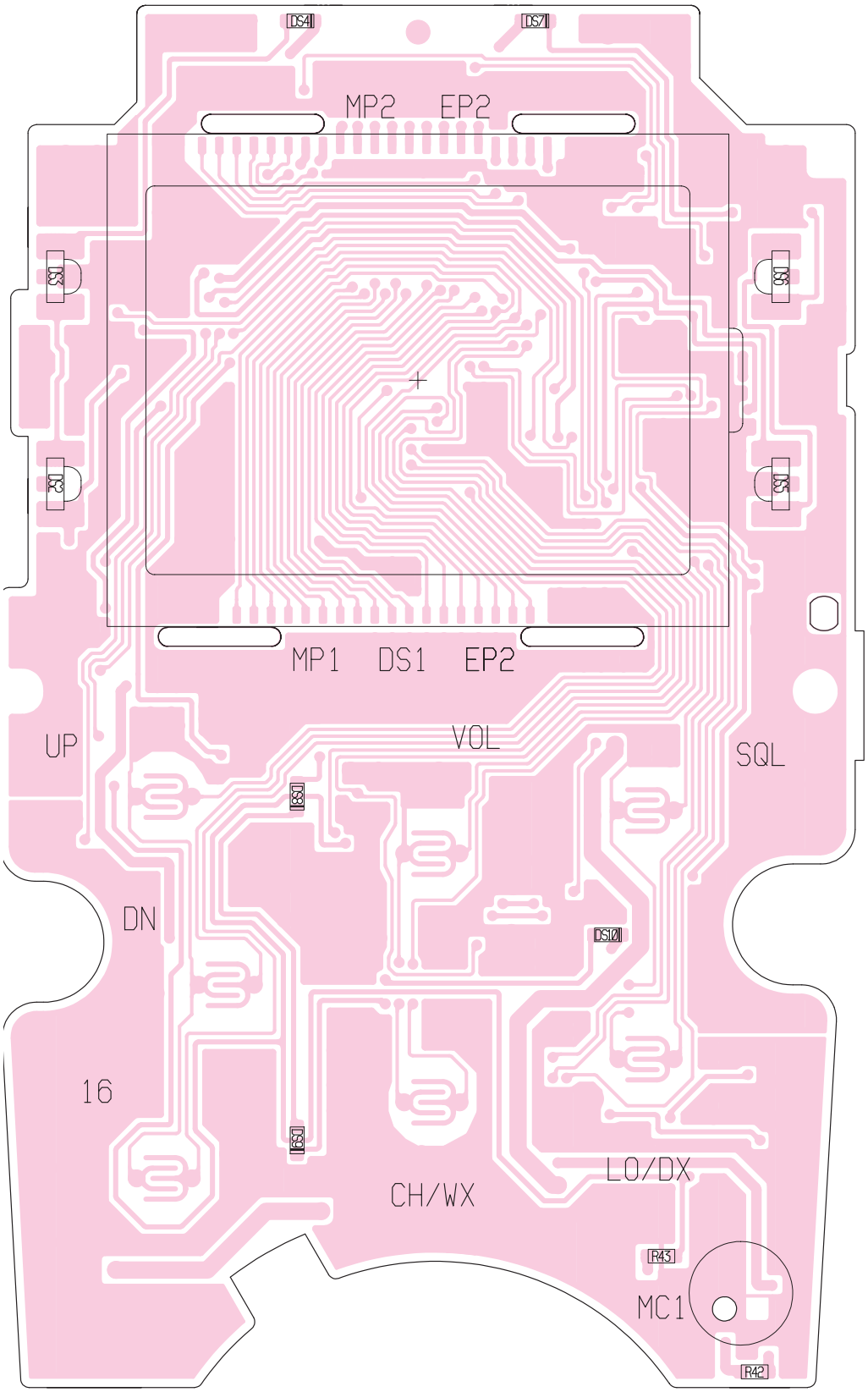
from Smart Mic HM-129

• **BOTTOM VIEW**

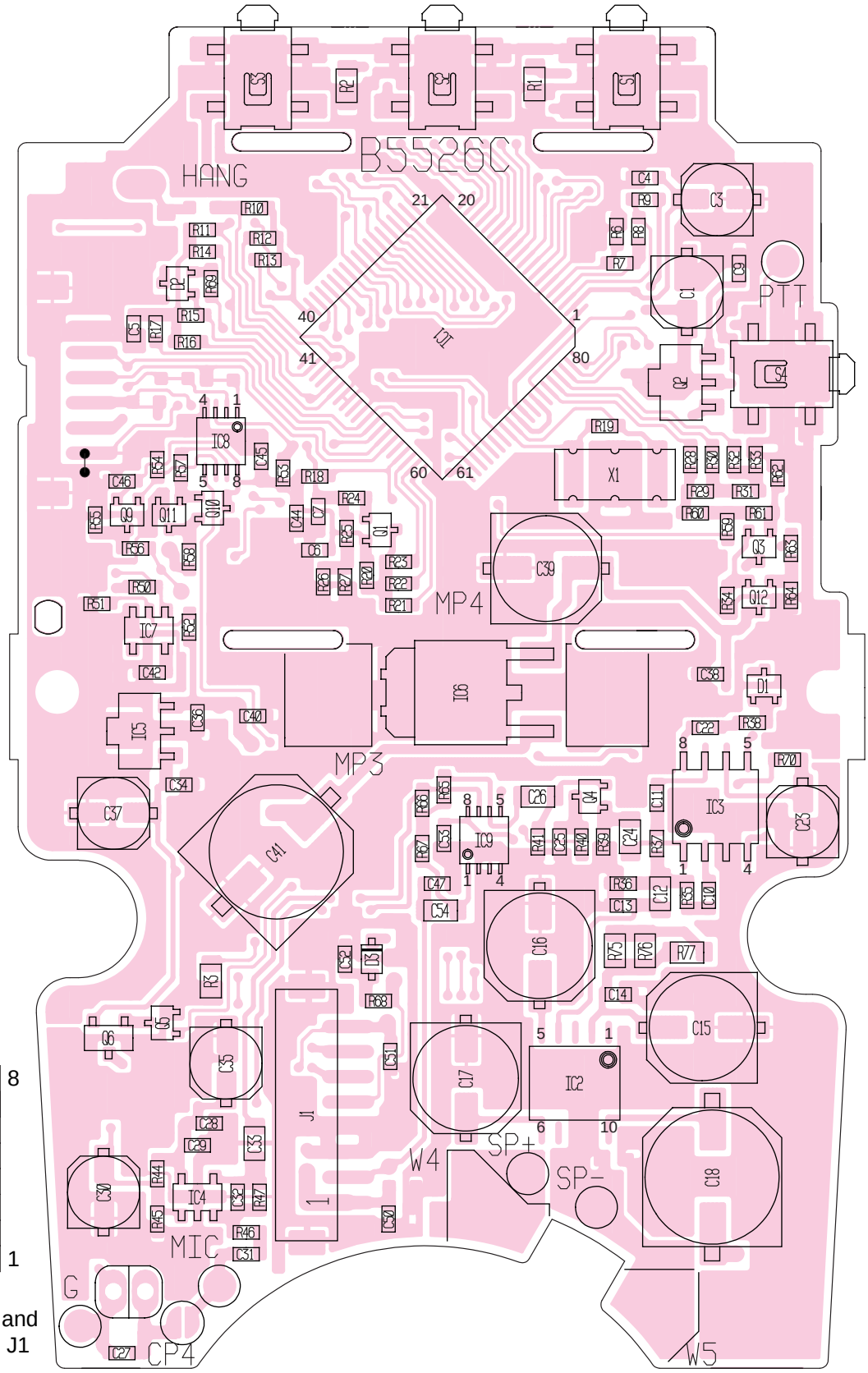

to LOGIC board J2
HV
GND
SP+
SP-
MP3
C82
C88
C89
R78
C103
R73
Q16
C93
D8
R79
C104
C97
C96
D9
C271
C81
C115
C116
C118
C187
R154
C87
C86
C85
R65
C188
C139
D16
C200
C201
C228
R39
D5
D6
R40
C49
C48
D2
D1
C272
C42
C41
R32
R134
C255
C262
C261
R31
R30
R29
R36
C44
C45
Q4
C25
R34
R35
R195
R196
R194
R193
C254
C253
R178
R150
Q26
R149
D14
R124
R129
R127
C161
C160
C123
C159
R130
R125
R128
R126
R122
R113
R138
R135
C154
C158
C162
R139
C163
R133
C155
R199
C273
C274
IC7
R201
C276
R168
L22
C219
L21
C218
C217
C220
D20
L24
C222
C221
L25
R12
R21
C16
C17
R11
C23
R49
C21
C28
C18
R133
R38
R20
C24
C25
R15
R37
C26
C31
C7
R9
C14
C208
R10
C229
Q2

9-6 HM-127 (OPTIONAL UNIT)

● **TOP VIEW**



● **BOTTOM VIEW**

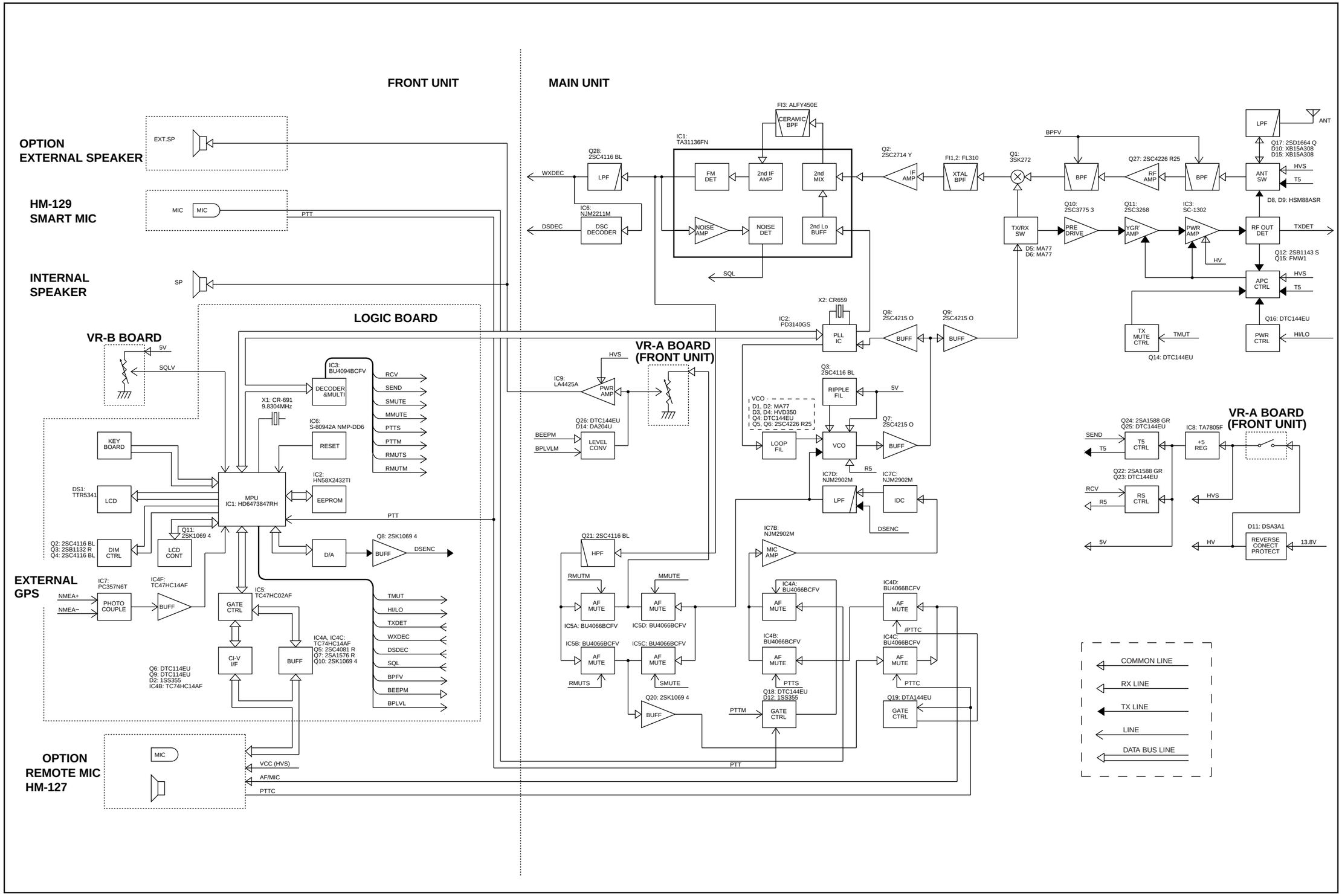


J1

PWRC	8
RRXDA	
RTXDA	
PTTC	
GND	
MICG	
AF/MIC	
VCC	1

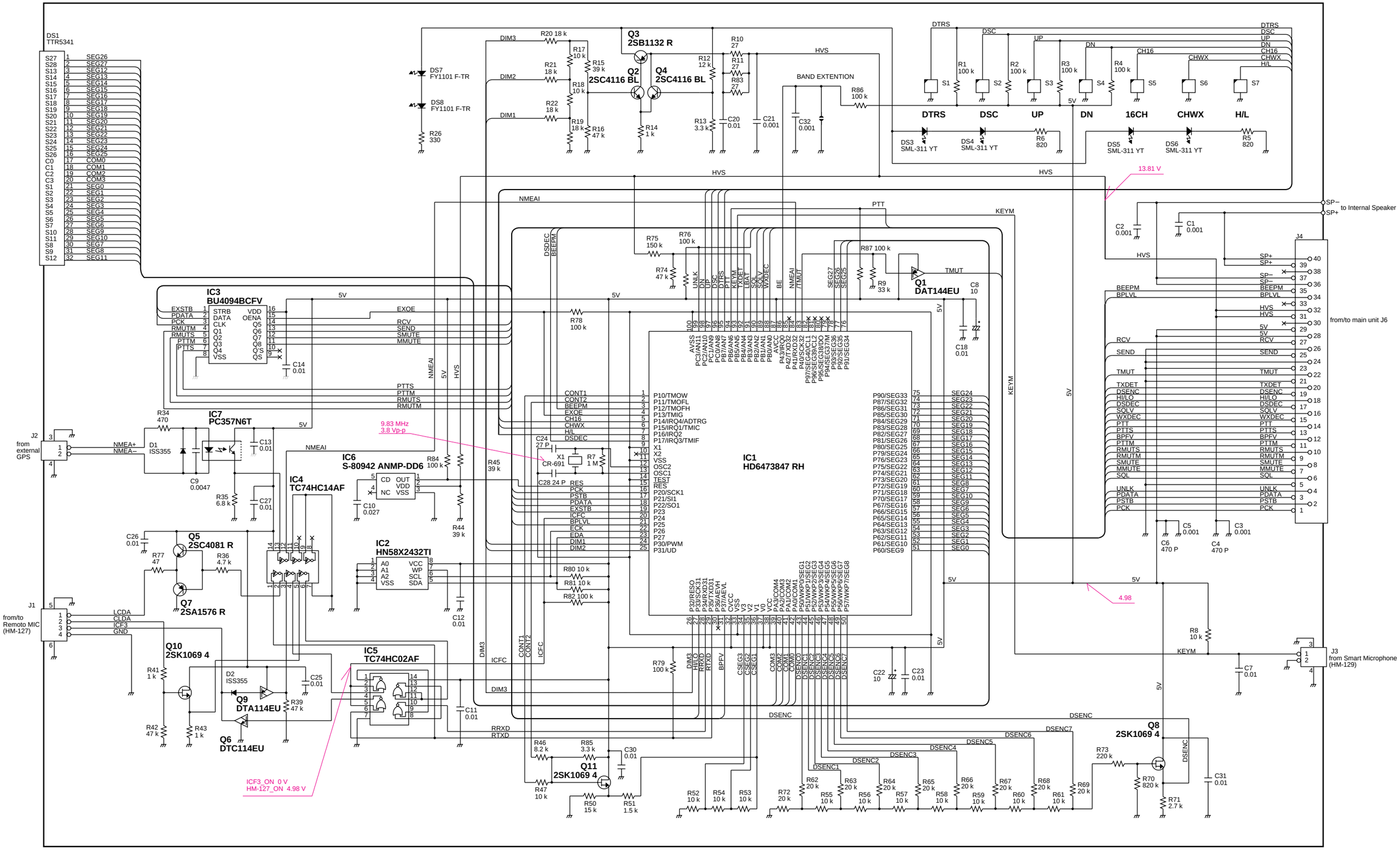
to IC-M402
MAIN unit J2 and
LOGIC board J1

SECTION 10 BLOCK DIAGRAM

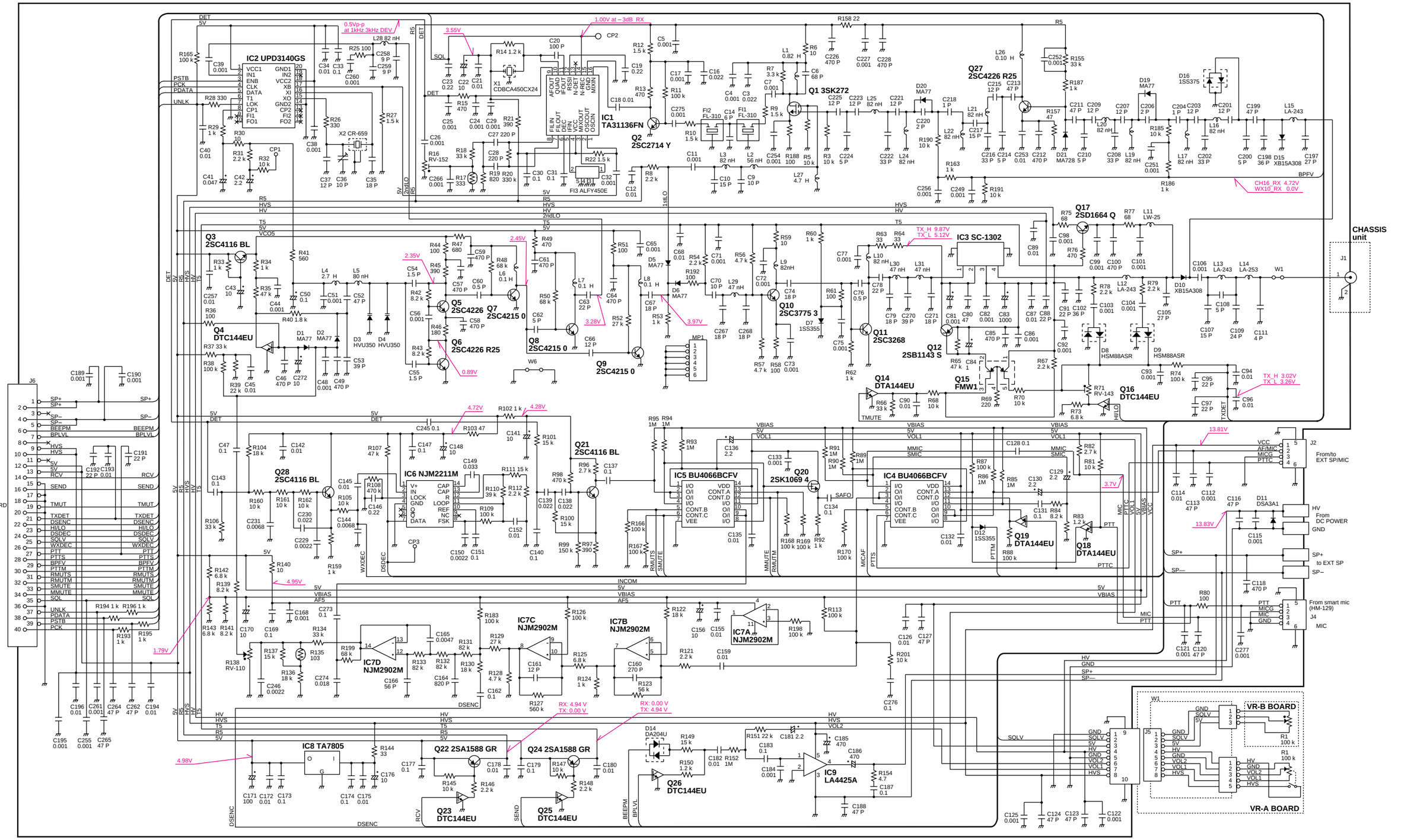


SECTION 11 VOLTAGE DIAGRAM

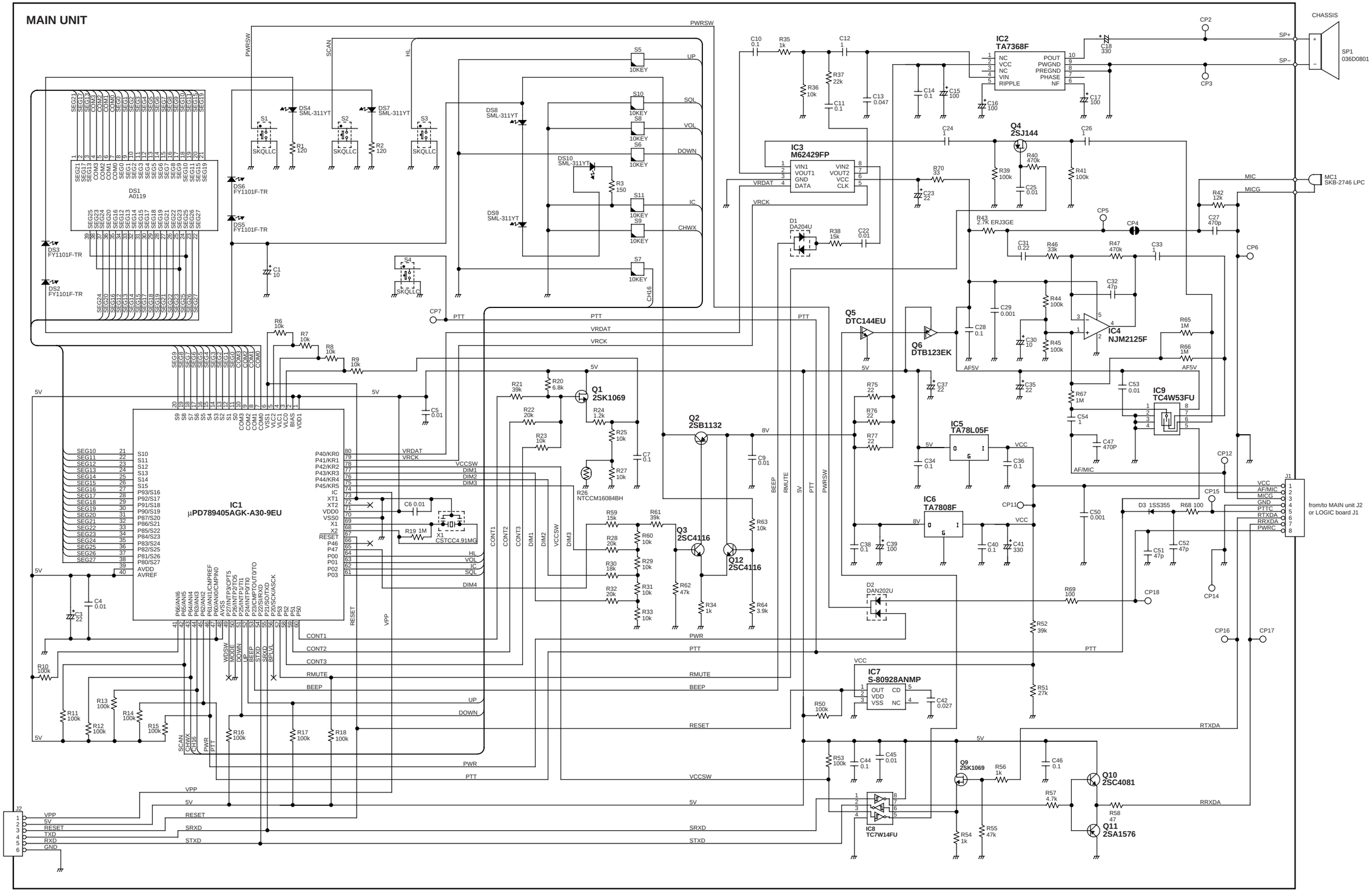
11-1 LOGIC BOARD



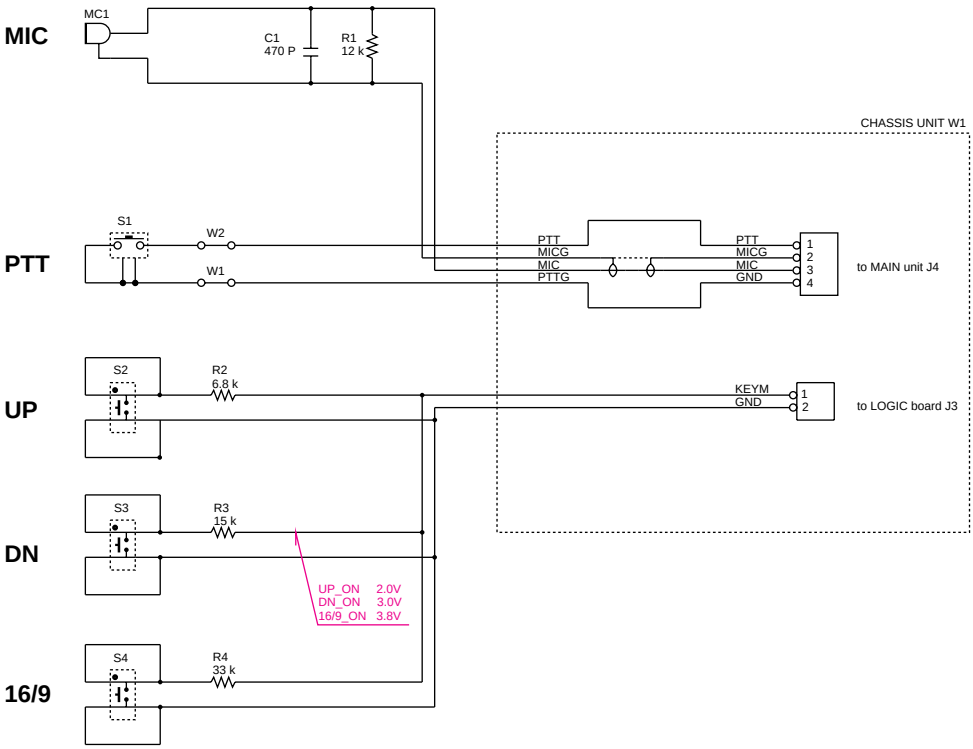
11-2 MAIN UNIT



11-3 HM-127 (OPTIONAL UNIT)



11-4 HM-129


MIC
MC1
C1
470 P
R1
12 k
CHASSIS UNIT W1
PTT
S1
W2
W1
PTT
MICG
MIC
PTTG
PTT
MICG
MIC
GND
1
2
3
4
to MAIN unit J4
UP
S2
R2
6.8 k
KEYM
GND
1
2
to LOGIC board J3
DN
S3
R3
15 k
UP_ON 2.0V
DN_ON 3.0V
16/9_ON 3.8V
16/9
S4
R4
33 k

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